

PVP

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PRODUCTION



Industrial Paint Mfg. Co.'s W. E. Hood
sees a consistent paint industry in the
South...not tied to seasonal painting
or varying demands for consumer goods.

45
14

Urethane Varnishes for Wood...p. 41

PVP

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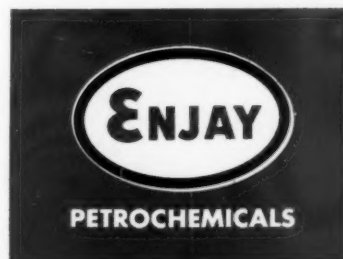
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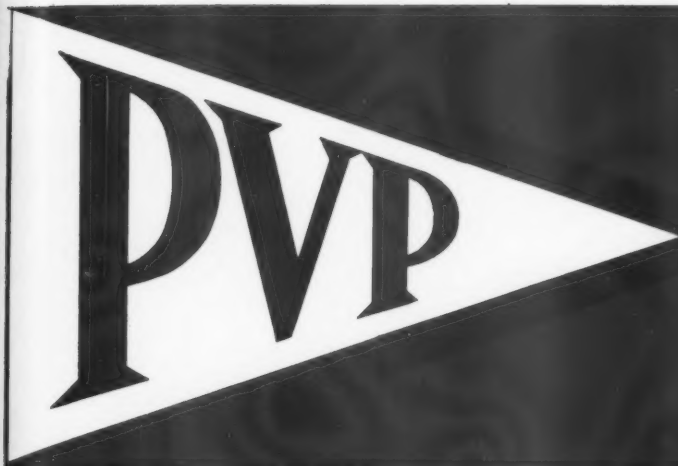
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MARCH
1961

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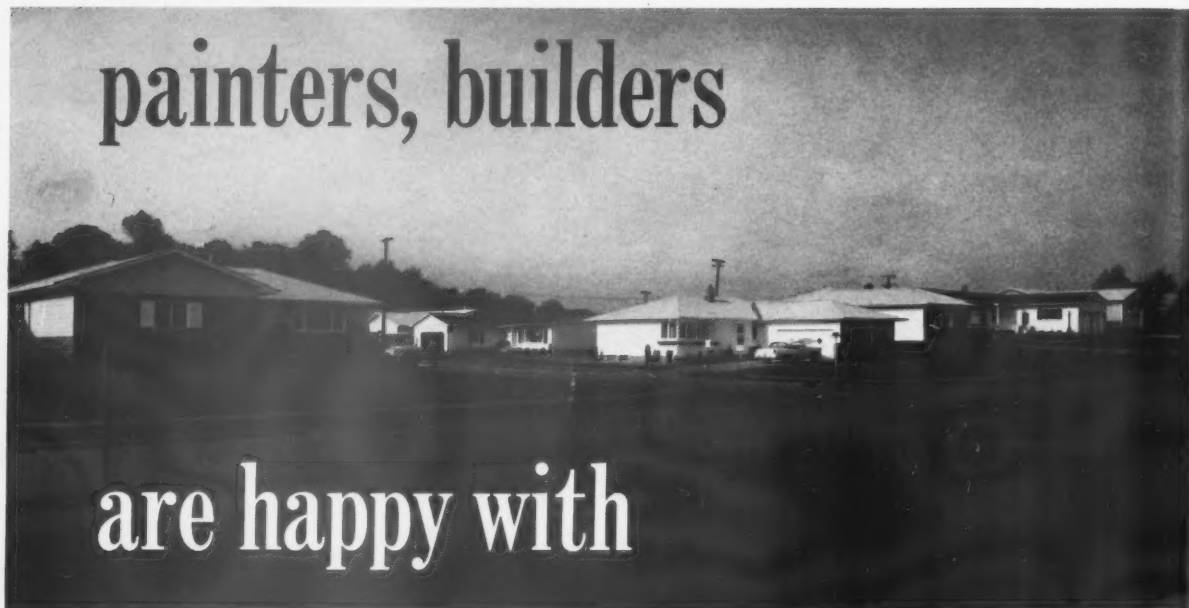
NEXT ISSUE

A new approach to water, alcohol, solvent, and plasticizer resistance of nitro-cellulose furniture finishes is the subject of an interesting article scheduled for our April issue.

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EDITORIAL

COMMENT

Interest in Water-Finishes Grows

THE phenomenal success of latex emulsion paints in the architectural field has spurred considerable activity toward the development of satisfactory water-thinnable finishes for industrial application.

Undoubtedly, the real interest in these finishes lies in their non-flammable, non-toxic, and odorless properties. As a result both water emulsion and solution-type finishes are being offered for product finishing. For best results, it was found that both emulsion and solution-type finishes should be thermosetting, thus requiring a baking cycle for obtaining adequate film properties.

Water as a diluent has vastly different physical characteristics than organic solvents. For example, the evaporation of water requires considerably more heat input than that of ordinary paint solvents. In solvent-based finishes, the evaporation rate can be controlled by simply varying the amount and types of solvent in the system. With water this is impossible. As a result water systems require longer flashoff times or higher heat-up rates during the baking cycle. Another problem associated with aqueous-baking systems is the possibility of film blistering during baking schedules. Since the boiling point of water is below the normal baking temperature, most of the water should be removed before the film reaches 212 degrees Fahrenheit to avoid blistering. To some extent, this problem can be overcome by adding alcoholic-type solvents to the system. This technique has met with considerable success in Europe and it was found that the addition of alcoholic solvents did not mitigate from the main features of water; namely lack of toxicity and fire hazard.

The adaptability of water-based finishes to present-day application methods seems to present no particular problem. Most water-soluble systems can be applied by normal spraying, dipping and flow-coating methods. Work carried

on in England indicates that both hot spraying and electrostatic-spraying do present some problems with water-based systems. Good results have been obtained with roller coating, providing the oil film is completely removed from the surface of the tin plate. In normal industrial practice, the oil film is not generally removed. This condition does not, for the most part, cause any serious film difficulties with solvent-based finishes. Obviously, such a surface would prevent the formation of a completely satisfactory film from aqueous paint.

Without question the most important requisite for satisfactory performance of water baking enamels is that the surface on which they are applied be absolutely clean and free from oil. As in solvent systems, phosphating treatments help to improve the corrosion resistance and adhesion of aqueous baking enamels. It is interesting to note that, based on recent tests, aqueous baking enamels outperform solvent-based coatings on galvanized steel, especially in adhesion.

From a cost standpoint, the savings resulting from using water instead of solvent is considered very small, and if other solvents are used to modify the system, then the difference is completely wiped out. Actually, the cost advantages gained from aqueous systems benefit the consumer more than the manufacturer.

Water-based finishes have shown practicality in several industrial applications. Because of the particular properties associated with water as solvent, problems in application do arise. However, water as a solvent offer many advantages to the consumer; of which the most important are non-flammability and non-toxicity.

In view of the impact that aqueous finishes have made in recent years, we can expect, in the immediate years ahead, a continued and serious effort toward the development of new and improved polymers which lend themselves to water-based systems.

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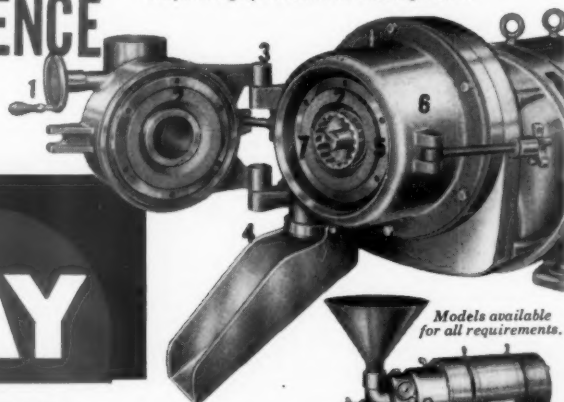
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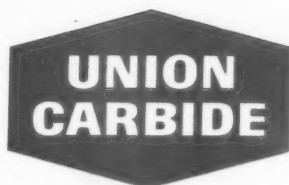
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				Time to pass A.T.T.	Walker-Steele (seconds) 24 hrs. 72 hrs.		Boiling Water		5% NaOH (77°F.)			
	1 hr.	2 hrs.	3 hrs.				1 hr.	7 hrs.	6 hrs.	24 hrs.	48 hrs.	8 days
BAKELITE Liquid Epoxy Resin ERL-2774	Faint Tack	Very Faint Tack	Tack Free	2½ hrs.	178	187	OK	OK	OK	OK	OK	OK
Solid Epoxy Resin (Epoxy assay— 875-975)	Faint Tack	Faint Tack	Very Faint Tack	4 hrs.	147	180	Mod. Cldy.	Mod. Cldy.	OK	OK	OK Slt. Blister	Fail

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Substitution of Empol 1022 Dimer Acid for a portion of the fatty acid modifier in epoxy ester coatings improves viscosity, caustic resistance, water resistance, through-dry, hardness, color retention, and flexibility. As an example, the table at the right shows the degree of improvement obtained in a test formulation made with a high I.V. liquid vegetable fatty acid. Formulations based on other proportions and other fatty acids should respond similarly.

This use in epoxy ester coatings is but one application of Empol 1022 Dimer Acid in the Surface Coatings Industry. Its unique composition (a mixture of 75% C₃₆ dibasic and 22% C₅₄ tribasic long-chain acids) makes it an unusually interesting material in many types of surface coatings. For product data and an experimental sample, write Dept. X-3.



ORGANIC CHEMICALS DIVISION,
Emery Industries, Inc.
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The extent to which 1022 can achieve improvements
in one epoxy ester coating is shown below:

COMPOSITION

Epi-Rez ¹ 530	50 parts	50 parts
Emersol ² 9315 D.D. Liquid F.A. ³	50	44.5
Empol ² 1022 Dimer Acid	0	5.5
% Solids	60	60
Solvent	Xylene	Xylene
Viscosity, Gardner-Holdt	N	X-Y
Acid Value	1.4	3.7
Color, Gardner	4	6

AIR DRY, SAND TRAIL METHOD (0.03 Co, 0.3 Pb as naphthenate dryers)

(adherence of sand
due to lack of through-dry)

3 hrs.	tacky	tack-free
8 hrs.	sl. tacky	tack-free

SWARD HARDNESS

2 days	2	2
1 week	6	8
2 weeks	13	16
4 weeks	22	27

CHEMICAL RESISTANCE PROPERTIES

Boiling 2% NaOH, 1 hr.	badly broken	sl. broken
Boiling Water		
1 hr.	sl. loss adhesion	unchanged
2 hrs.	pimples	pimples
4 hrs.	darkened, broken	darkened, not broken
2% Tide ⁴ , 160°F, 4 hrs.	lifted badly	lifted badly

5 DAY ULTRA VIOLET EXPOSURE OF PAINTS

Change in yellowing index (Larger value indicates more yellowing)	8.6	3.9
Impact resistance after exposure (Gardner variable impact, inch-lbs)		
Concave	>160	>160
Convex	110	140

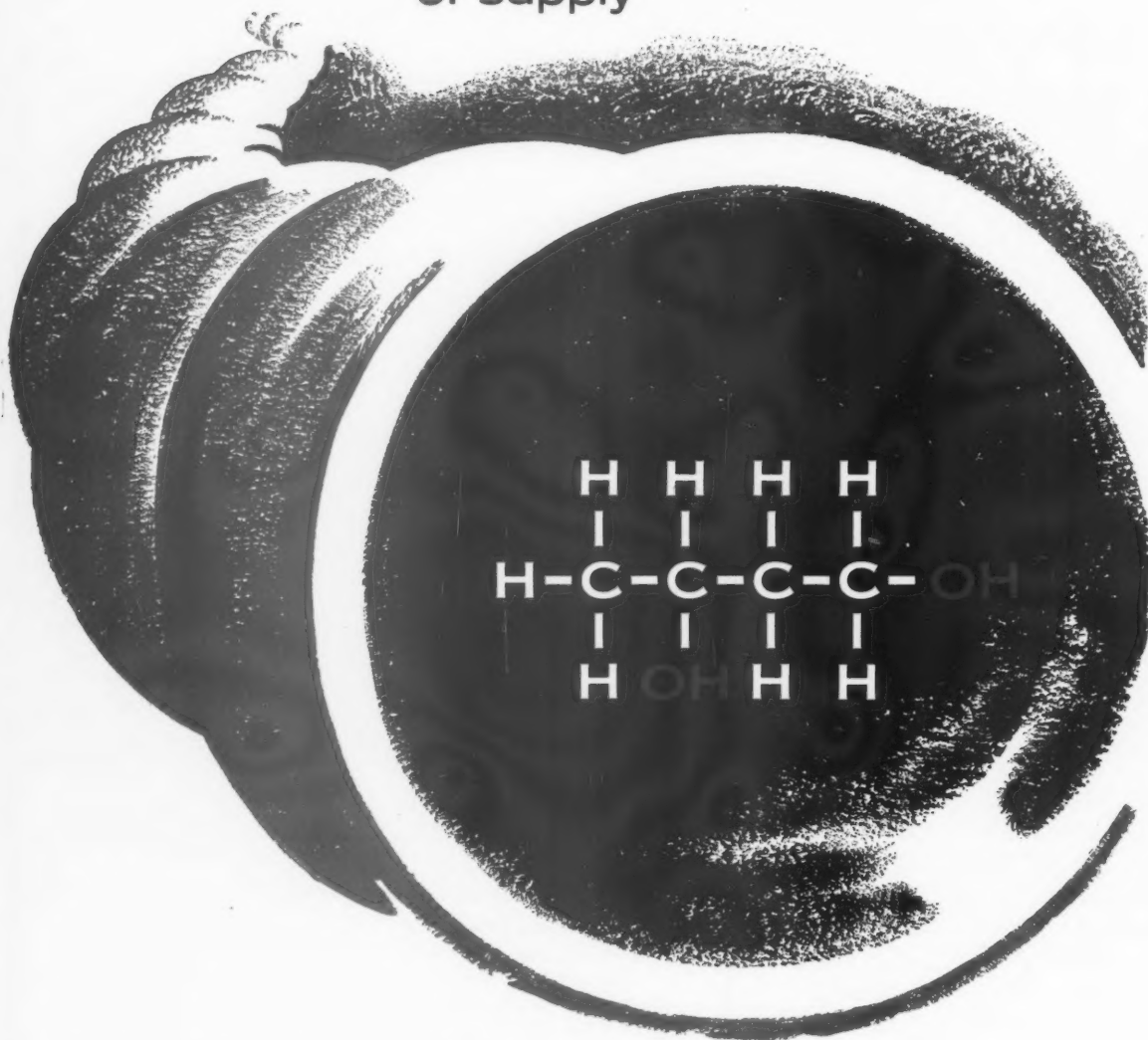
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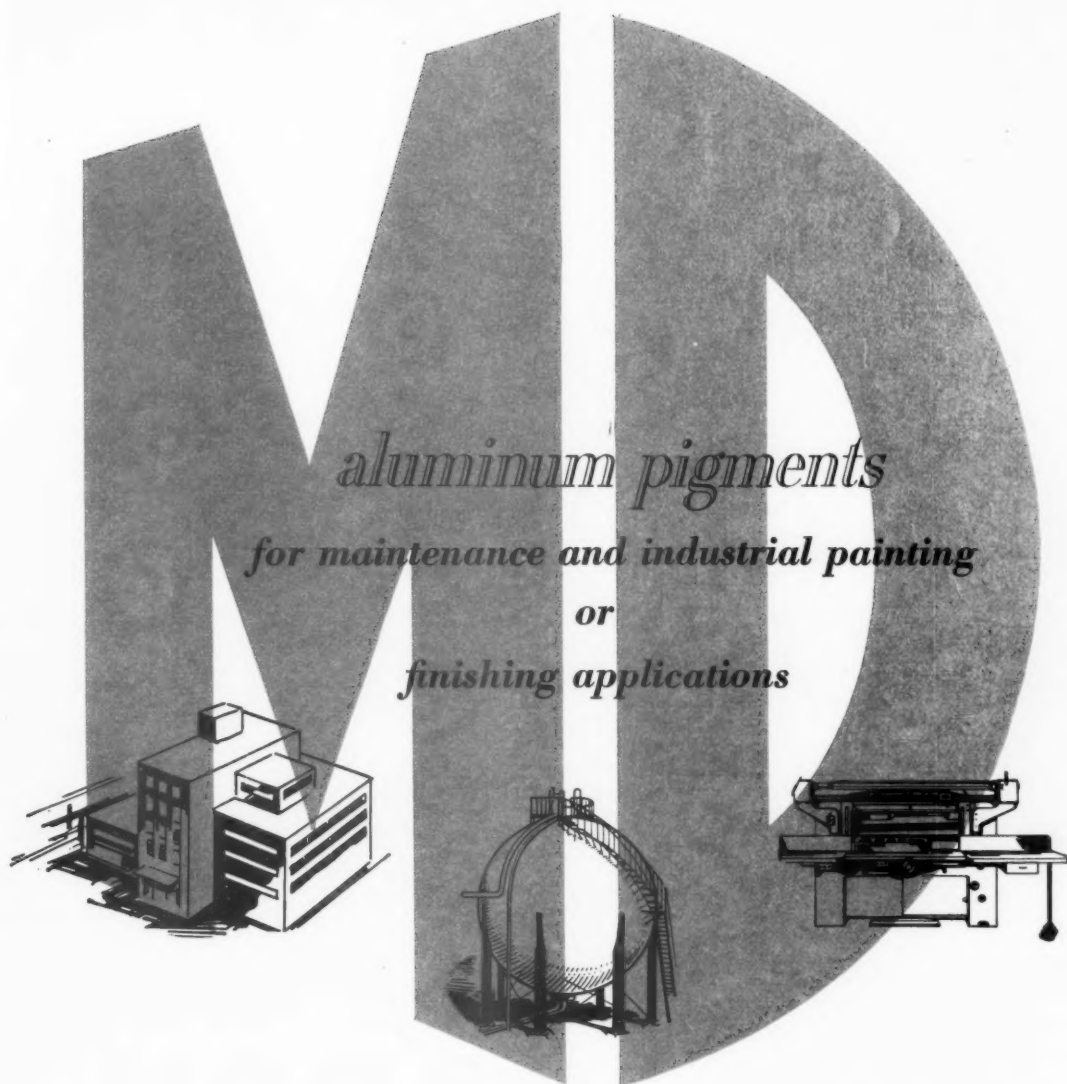
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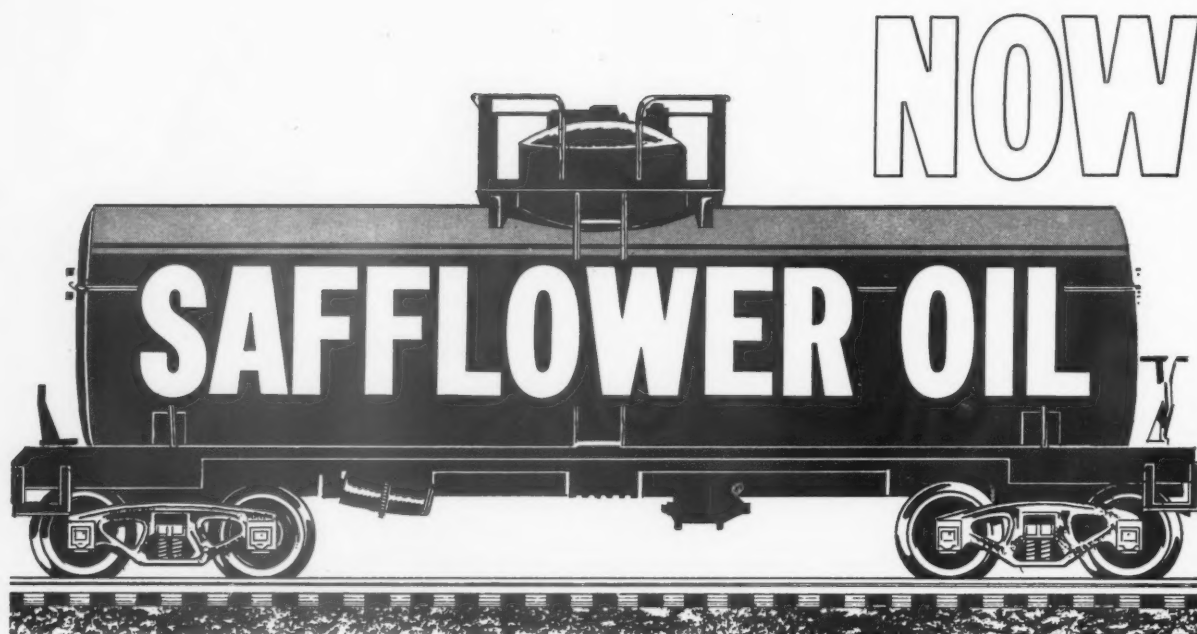
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GAS EVOLUTION IN ZINC DUST PAINT

By

W. J. Lantz*

Metallic zinc dust has been used as a paint pigment for well over one hundred years(1). The exact mechanism by which it inhibits corrosion is not known, although the most widely accepted theory at present is that of galvanic protection. The formation of zinc soaps and voluminous alkaline corrosion products may also contribute to the inhibitive properties of zinc dust.

The zinc dust-zinc oxide oil and oleoresinous paints have never been fully utilized, not because of inferior performance, but rather as a result of problems encountered in packaging and storage. The evolution of gas from the ready-mixed zinc dust paints frequently caused the containers to leak or burst.

In order to product a marketable material some manufacturers used a two compartment container in which the zinc dust was packed separately from the zinc oxide base. Another method employed to increase the shelf life of the paint was to gasket the container with a material which permitted gas leakage. However, deviation from standard packaging procedure places an item in a specialty class requiring a higher price and consequently fewer customers.

The addition of hygroscopic materials such as lime to the zinc dust in order to absorb the moisture in the paint and thereby prevent gassing has been a common practice for many years (2). This application was based on the assumption that the free fatty acid in the paint vehicle reacted with the zinc oxide to form water which then reacted with the zinc dust to form hydrogen gas. In reality lime has been found to be effective as a gas inhibitor for only short periods. After several weeks at room temperature gas formation is again encountered in paints formulated with lime treated dust. Thus, zinc dust-zinc oxide paints are generally prepared to order and are almost never stocked as a standard item of production.

Preventing Gas Formation

Besides acidity of the vehicle, as already mentioned, gas evolution has also been attributed to residual

moisture in the paint components, particle size of the zinc dust and trace impurities in the zinc dust. Preliminary work indicated that residual moisture and vehicle acidity were the major factors causing gas evolution in a zinc dust paint. Particle size only became important when the mean diameter of the dust was in the 2.5 to 3 micron range. This, however, only indicated greater reactivity because of increased surface area and could not be considered as a cause of gas evolution.

A correlation between trace impurities and gas formation did indicate that metallic impurities were not a significant factor at the low levels that are normally found in commercial zinc dust.

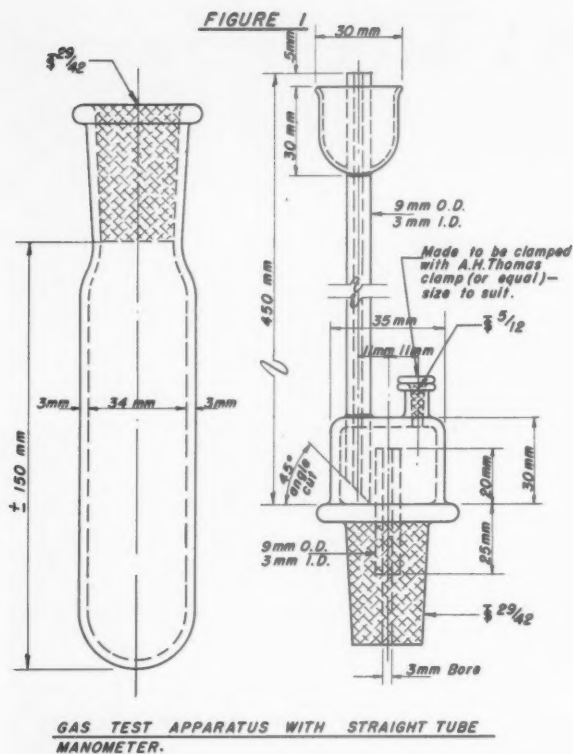
The obvious approach to the prevention of gas formation was to tackle the major causes, residual moisture and acidity. In this approach, the problem was to prevent gassing in the conventional zinc dust-zinc oxide oil and oleoresinous paint and not to formulate a new paint. The basic paint formulations were prepared to meet the requirements of Federal Specification TT-P-641b Primer, Paint, Zinc Dust-Zinc Oxide (for galvanized surfaces) Type I—Linseed Oil, Type II—Phthalic Alkyd Resin and Type III—Phenolic Resin (Table I).

TABLE I
PAINT FORMULATION

Material	Type I	Type II	Type III
Zinc Dust	62.4%	49.6%	51.2%
Zinc Oxide	15.6%	12.4%	12.8%
Non-Volatile Vehicle	19.6%	16.3%	18.0%
Thinners + Driers	2.4%	21.7%	18.0%
Weight per gallon	23.3 lbs.	16.0 lbs.	16.6 lbs.

To keep within the quantitative and qualitative requirements of the specification and to avoid severe changes in the performance characteristics of the dry paint films, only small amount of water scavengers and basic materials could be added to the prepared paints. When liquid additives were used, they replaced the solvent on a weight basis. Solid additions were incorporated with the dust. Twenty-nine materials, singly and in combination were investigated. This

*American Smelting and Refining Co., Central Research Laboratories, South Plainfield, N. J.



paper will cover the most promising additives and the study to determine the cause of gas evolution in the zinc dust paint. The major portion of this work was done with the linseed oil paint. The additives which proved satisfactory with this formulation were then incorporated in the alkyd and phenolic resin paints and the gas inhibitive properties were determined.

Experimental Methods

Moisture:

Moisture in the paint components was determined by at least one of the following methods:

- (1) Oven drying at 105-110°C (TT-P-141b Method 407.1)
- (2) Azeotropic Distillation (TT-P-141b Method 408.1)
- (3) Titrimetric (TT-P-141b Method 408.2)
(Stabilized Karl Fischer Reagent used)

Acid Number:

The procedure described by TT-P-141b Method 507.1 was used on all three paint vehicles. This method is not acceptable for acid number of varnishes, but the purpose of this work was to determine the amount of base required to neutralize the free fatty acid and not to decompose existing soaps or esters.

Gassing:

As a rapid screening test to measure gas produced by a zinc dust paint, the pressure developed by two ounces of paint stored in a 2-2/3-ounce metal container at 125°±5°F for 184 hours was measured with a canner's gauge.

For a more accurate measurement when only small pressures were developed, the apparatus shown in Figure 1 was used. The tube, filled with

paint, was kept at 125°±2°F in a water bath. The developed pressure was measured in millimeters of mercury and corrected for barometric variations.

Discussion and Results

Mr. A. P. Baruch (3) on studying the effect of additives to reduce gassing in zinc dust paints found that calcium oxide, silica gel and triisopropyl borate were the most effective inhibitors in the short term can tests. The ability to absorb or react with water is common to the three additives. If moisture is the cause of gassing then the amount of water in each of the paint components had to be determined (Table II) so that sufficient water scavenger could be added.

TABLE II
TYPICAL VALUES OF MOISTURE CONTENT
IN ZINC DUST PAINT COMPONENTS

Material	Distillation	Method	
		Titration	Oven Dry
Zinc Dust	0.008%	0.008%	0.01%
Zinc Oxide	—	0.13%	0.11%
Linseed Oil	<0.1%	0.04%	—
Alkyd Resin (70% Solids)	—	0.04%	—
Phenolic Varnish (60% Solids)	—	0.03%	—
Driers	<0.1%	—	—
Mineral Spirits	<0.1%	0.02%	—
Zinc Oxide/RLO Base	0.06%	—	—
Vacuum Dried RLO	—	0	—

Based on the figures in Table II the water present in one gallon of linseed oil paint would be about 0.007 pound. If this water would react completely with zinc dust, according to the equation:



then 0.16 cu. ft. of gas at standard conditions would be formed. If this gas were confined in the nine cubic inch void space of a filled gallon can, a pressure in excess of 400 psi would develop.



If calcium oxide is added to combine with the residual moisture according to the equation:

then 0.022 pound of CaO would be required. In practice, lime is added in amounts of 0.5% to 1.0% by weight on the zinc dust, which totals 0.07 to 0.14 pound/gallon for the oil formulation. Even with this three-fold excess, gassing is only retarded.

Silica Gel

Silica gel was most effective when added at a concentration of 5% by weight on the dust. If it is assumed that the material will absorb 40% of its weight in water, then only 0.14% silica gel in the dust would have been necessary. Again with an excess of water absorbent, gassing was not completely prevented. Because the viscosity of the paints incorporating silica gel exceeded the requirements of the specification, silica gel was not considered practical and dropped from further tests.

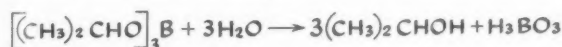
Triisopropyl Borate

Triisopropyl borate, the third effective inhibitor,

TABLE III
COMPARISON OF GAS INHIBITIVE PROPERTIES OF LIME,
TRISOPROPYL BORATE AND TETRAETHYL ORTHOSILICATE IN
LINSEED OIL BASE PAINT (OIL OF ACID NUMBER 3.7) AT 125°F

Additive	Amount	Pressure in mm Hg				
		11 Days	20 Days	33 Days	52 Days	
CaO	0.5% on dust	42	234	—	—	
	0.5% on paint	40	203	—	—	
TIPB	0.49% on paint	20	81	170	—	
	0.75% on paint	10	75	132	—	
	0.99% on paint	11	45	112	—	
	1.23% on paint	9	43	92	—	
TEOS	1.25% on paint	22	30	37	42	
	1.50% on paint	13	22	25	26	

reacts with water as follows:

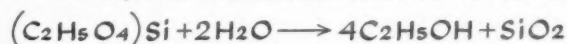


The theoretical amount required to react with the moisture in the paint would be .12% by weight of the paint. When added in amounts of 0.46% and 0.92% no gassing was observed.

Several other water scavengers which could react with water in a manner similar to triisopropyl borate were investigated. Tetraethyl orthosilicate (TEOS) and aluminum isopropylate were found to be effective gas inhibitors in the can tests. The aluminum compound, however, caused livering of the paint and was dropped from further testing. Also, the dry film obtained from a freshly prepared paint containing aluminum isopropylate checked badly.

Tetraethyl Orthosilicate

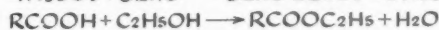
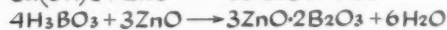
Tetraethyl orthosilicate reacts with water as follows:



To react with the water in this linseed oil paint approximately 0.04 pound of TEOS, 0.17% by weight of the paint, is necessary.

The gas inhibitive properties of calcium oxide, triisopropyl borate and tetraethyl orthosilicate were then compared (Table III). The TEOS reduced gassing most effectively, but not completely; gas evolution continues at a very slow rate. The amount of TEOS used was eight times greater than that theoretically required to tie up all the residual moisture.

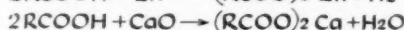
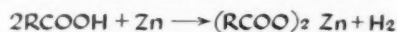
On the assumption that the primary reaction is between residual water and the additive, then the reaction products $\text{Ca}(\text{OH})_2$, H_3BO_3 and $\text{C}_2\text{H}_5\text{OH}$ in secondary reactions may also be a source of water.



When an excess of water scavenger is present, the water formed in these reactions will continue to react. Reaction of this water is not selective and zinc dust as well as the water scavenger may react. However, after the water scavenger has been consumed, the original problem is returned. Based on experience with lime treated dust with its initial non-gassing properties this secondary reaction is quite probable. The boric acid zinc oxide reaction is also favored under the existing conditions.

With TEOS the original gassing problem is not restored. The TEOS reaction product, ethanol, can only react until the free fatty acid and water is con-

sumed. The silica formed is stable in this system. The fatty acid ethanol reaction could produce about 0.005 pound of water requiring another 0.12% TEOS to react with it. The conditions, however, are not favorable for esterification and much less favorable for the reaction to proceed to completion. Another source for the slow evolution of gas must be found. The reaction of fatty acid with zinc dust and/or lime, if lime treated dust is used, is such a source:



While it is possible and claimed by some that zinc oxide may also react with the fatty acid, the low moisture content of the zinc oxide linseed oil base (0.06%) (Table II) does not indicate that the reaction proceeds to any great extent. If reaction occurred, the amount of water that should be found is 0.1%.

An oil with an acid number of 3.7 if completely reacted with zinc would produce about 0.05 cu. ft. of gas per gallon of paint. If this were the only source of gas, a pressure of about 140 psi would develop in the void space of a filled gallon can. From moisture and acid the total pressure that can be generated in the system is greater than 540 psi. In order to determine the relative magnitude of gassing caused by acid number and moisture, various mixtures of the paint components were prepared and stored at 125°F (Table IV). The zinc dust and tap water reacted quite rapidly. The residual water in the mineral spirits did not react. Actually this small amount of water introduced by the mineral spirits could be adsorbed on the dust without reaction. The zinc oxide containing mixtures whether zinc dust was present or not showed pressure decreases. While it appears that those mixtures of zinc oxide and linseed oil containing zinc dust did not show as great a pressure decrease as the mixtures without zinc dust, there is not sufficient data or accuracy in the measurement to prove this point. A test of longer duration may show gas evolution in these zinc dust containing mixtures.

All of the linseed oil zinc dust mixtures developed pressure. The anhydrous mix did not develop as great a pressure as the residual moisture containing systems.

These observations can be made:

- (1) Water reacts with zinc dust to produce gas.
- (2) Free fatty acid reacts with zinc dust to produce gas.
- (3) In an anhydrous system gas formation is reduced.
- (4) Zinc oxide may serve as a buffer or acid adsorber in the system.

TABLE IV
GAS TEST—SCREENING METHOD AT 125°F FOR 184 HRS.
ON
VARIOUS MIXTURES OF ZINC DUST PAINT COMPONENTS
WEIGHT OF MATERIAL IN GRAMS

MATERIAL										
Zinc Dust (as rec'd.)	200	200			200				10	200
Zinc Dust (Dried)			200	200						10
Zinc Oxide						30	30		30	
Zinc Oxide (Dried)								30		30
Linseed Oil	35		35			40		40	40	
Linseed Oil (Vac. Dried)		35		35			40			40
Mineral Spirits					20					
Water										20
Pressure Developed in psi	+8*	+8.5	+9	+4	0	-4	-3	-4	-2	-1 +**

* —Oil leak in seal.

**—Container exploded before being placed in oven.

Alkaline Additives

Since addition of tetraethyl orthosilicate produced the lowest gassing paint formulations with oils whose acid numbers were lower than 4, gas evolution from paints formulated with oils of greater acid number at a constant level of water scavenger was determined (Table V). The oils were prepared by adding linseed fatty acids to the base raw oil of acid number 3.7 before compounding. As the acidity of the vehicle increased, more gas was evolved. In all cases excess water scavenger was present to react with any water that might form.

TABLE V
EFFECT OF ACID NUMBER ON GAS EVOLUTION
(1.25% TETRAETHYL ORTHOSILICATE)
12 Days at 125°F

Acid No. of Oil	Pressure in mm Hg
3.7	38
8.9	165
13.6	293
21.1	>450

Alkaline materials such as calcium silicate, triethyl amine, diethylene triamine, sodium benzoate and red lead were added to change the pH of the medium, either by reacting with the fatty acid or buffering the linseed oil. No water scavenger was used with these materials. Red lead, checked at seven levels of concentration ranging from 0.125 to 1.5% by weight of the zinc dust was found to be most promising when added at the 0.25% level. The results were erratic and may have been caused by improper dispersion of the red lead in the vehicle. Many of the solid additives might have proven more beneficial if they had been ground into the vehicle instead of being mixed into the paint with the zinc dust. The data indicate that an alkaline material alone is not sufficient to reduce gassing. Gassing then must be from residual moisture reacting with the zinc dust.

Paints were prepared with an oil of acid number 3.7 in which the tetraethyl orthosilicate concentration was maintained at 1.25%. To these paints, calcium oxide and diethylene triamine were added in various amounts (Table VI). Gas formation decreased with increasing amounts of neutralizer. The theoretical amounts of calcium oxide and diethylene triamine necessary to neutralize this oil would be 0.39% and 0.23% by weight of the oil respectively. When these theoretical

amounts are added to the raw oil, the system to which the amine was added produced a sludge which could be completely redispersed, while the lime addition formed a soft white sediment which was assumed to be unreacted CaO. Grinding of the lime into the oil may produce a completely reacted and neutral oil which should produce a paint developing no pressure at the theoretical neutralization value for CaO.

TABLE VI
EFFECT OF NEUTRALIZER
PLUS WATER SCAVENGER (1.25% TEOS)
ON GAS INHIBITION—17 DAYS AT 125°F

Material	w/o on Dust	w/o on Oil*	Pressure (mm Hg)
CaO	0.05	(.16)	21
	0.075	(.24)	12
	0.1	(.32)	9
	0.2	(.64)	4
DTA		.1	21
		.2	11
		.3	0
		.4	4

*Acid No. of Oil = 3.7

The data indicate that excess amine reacts to produce gas. The variation in pressure for duplicate samples may sometimes be greater than the 4 mm. difference shown here. This is only an indication that additional work in this region is necessary.

On a weight basis smaller amounts of amine could be used to produce a low gassing paint as compared to lime. Also, 0.2% diethylene triamine on the oil did not produce a sludge and was easily mixed into the oil. The liquid system tetraethyl orthosilicate-diethylene triamine-linseed oil was then studied. Paints were prepared in which the amount of water scavenger was varied while the amine, when present, was maintained at one concentration. The oil was treated with the additives twenty-four hours before compounding. The pressure developed by these paints was measured over a period of 106 days (Table VII).

As the water scavenger content was increased, gas formation was reduced. There was not too great a reduction in pressure by increasing the silicate from 5 to 8% on the oil. The amine is definitely beneficial. The effect of dry zinc oxide is of academic interest only, because removal of adsorbed moisture is not economically possible. From Table II it was shown that 60% of the total residual moisture is introduced

TABLE VII
EFFECT OF CONCENTRATION OF WATER SCAVENGER AT
CONSTANT NEUTRALIZER CONTENT ON GAS INHIBITION AT 125°F

w/o TEOS on paint	w/o TEOS on oil	w/o DTA on oil*	6 Days	Pressure in mm Hg after -		106 Days
				52 Days	93 Days	
0.20	1	0.2	147-144	—	—	—
0.59	3	0.2	—	61-69	—	—
0.98	5	0.2	—	35-43	51-53	56-57
0.98	5	—	—	56-64	77-84	82-88
1.57	8	0.2	—	40-48	47-59	50-65
1.57**	8	0.2	—	22-24	21-22	—

*Acid No. of oil = 3.7

**This paint formulated with dried ZnO

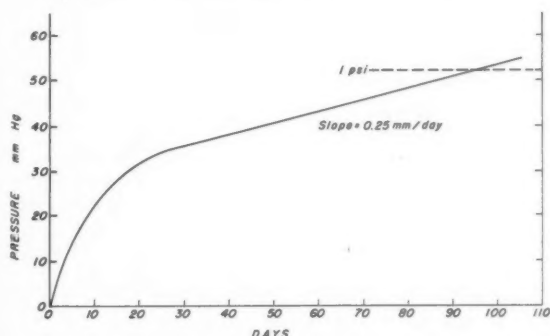
into the finished paint by the zinc oxide. Removal of this water by the use of dry ZnO reduced gas formation by almost that amount. In addition the pressure developed has stabilized and reached a maximum after only twenty-one days. The pressure at maximum developed by the paint using dry ZnO is slightly less than $\frac{1}{2}$ psi.

In Figure 2 the pressure developed by the paint containing 5% tetraethyl orthosilicate and 0.2% diethylene triamine on the weight of the oil has been plotted. The rate of gas formation is quite rapid during the initial storage period. After fifteen days at 125°F the rate becomes constant at 0.25 mm. per day. This same paint stored in a can at room temperature did not develop any pressure during the test period.

The addition of the additives to the oil twenty-four hours before compounding produced a definite im-

FIGURE 2

GASSING OF A ZINC DUST LINSEED OIL PAINT CONTAINING 5% TEOS AND 0.2% DTA ON THE OIL AT 125°F.

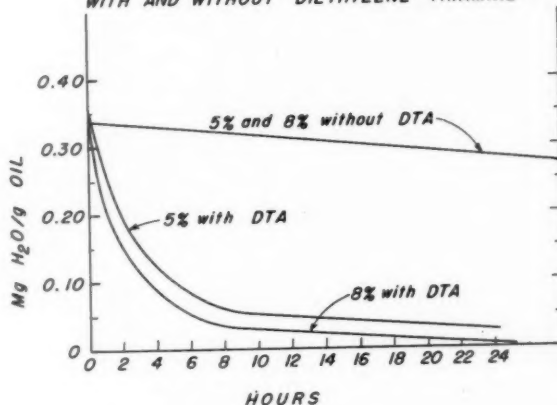


provement because the amount of silicate necessary to effectively reduce gassing could be decreased. In this manner, the water-TEOS reaction forming rather stable end products prevents additional reaction when the oil and zinc dust are compounded. The rate of reaction of tetraethyl orthosilicate with the residual water in the oil was determined (Figure 3). The amine accelerates the reaction. Because of the great accelerating effect of the amine on the reaction, its action as a neutralizer may now appear questionable. All indications are that it serves a dual purpose as a neutralizer as well as a catalyst. Treating of the oil prior to compounding does produce an oil very low in moisture. From this treated oil low gassing zinc dust paints have been prepared.

The small amount of gas evolution that occurs in a paint treated with tetraethyl orthosilicate and di-

FIGURE 3

RATE OF REACTION OF TETRAETHYL ORTHOSILICATE WITH WATER IN LINSEED OIL WITH AND WITHOUT DIETHYLENE TRIAMINE



ethylene triamine may come from three sources:

- (1) Migration of the water adsorbed on the zinc oxide to the vehicle. In the liquid phase the moisture can react with the water scavenger as well as the zinc dust.
- (2) Reaction of unneutralized fatty acid with zinc dust, since insufficient amine is added to the system for complete neutralization in order to avoid sludge formation.
- (3) Vapor pressure of ethanol formed after the system is sealed.

All three are possible. Since the pressure of the paint employing dry zinc oxide leveled off at $\frac{1}{2}$ psi, the water adsorbed on the oxide can be considered a contributing factor to residual gassing. Also, since little additional ethanol can be formed in situ after this paint containing dry ZnO has been compounded and system sealed, pressure from ethanol can be disregarded in this paint.

The amount of neutralizer added to the paints theoretically reduced the acid number to about 0.4 or to the alkali refined oil level. The maximum pressure that could develop from this amount of fatty acid if completely reacted and confined in the nine cu. in. void space of a filled gallon can is 14 psi. This is a tenfold reduction in pressure that could develop with the oil of 3.7 acid number.

In summary the pressure developed by residual gassing is quite low in all paints incorporating the water scavenger and neutralizer. These paints stored

TABLE VIII
EFFECT OF CONCENTRATION OF TEOS ON GAS INHIBITION
IN ALKYD PAINT AT CONSTANT DTA CONTENT

w/o TEOS on Alkyd Solution	w/o DTA on Alkyd Solution*	4 Days	52 Days	63 Days
1.2	0.45	197,234	—	—
3.0	0.45	3,6	105,112	154
5.0 (Note)	0.45	Negative	74,100	76,111
5.0	—	93,74	194	—
7.1	0.45	5,7	201	236
w/o CaO on Dust				
0.5 (Lab Prepared)		189,170	—	—
0.5 (Comm. Dust)		215,263**	—	—

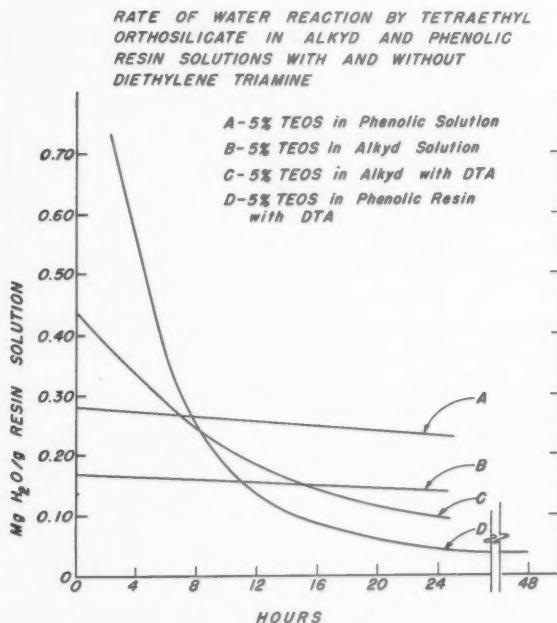
* Acid No. of Alkyd Resin Solution = 8.0

**3 Day Test

NOTE: All paints except 5% silicate treated with amine had gas pockets in pigment layer of paint.

at room temperature should not develop pressure in the container.

FIGURE 4



Moisture Formation in Alkyds and Phenolics

The rate of moisture reaction in the alkyd and phenolic resin solution was also measured (Figure 4). Again the amine accelerates the reaction, even though additional moisture is introduced into the system because of the hygroscopic nature of the amine. The reaction of tetraethyl orthosilicate with water in the oleoresinous vehicles is not as complete as with the moisture in the linseed oil.

Paints were prepared with the alkyd and phenolic resins and the pressure developed by these paints was measured (Table VIII and IX). While the additives were not as effective as with the linseed oil, the improvement over the lime treatment is quite apparent. In the case of the phenolic resin, the addition of the amine resulted in a reduction of viscosity of the zinc oxide base. Additional work is necessary on these two types of paint.

The amount of amine or lime added to the system is based on the acid number of the oil or resin solution. The amount of tetraethyl orthosilicate is dependent

TABLE IX
EFFECT OF CONCENTRATION OF TEOS ON GAS INHIBITION IN PHENOLIC RESIN PAINT

w/o TEOS on Varnish	w/o DTA on Varnish*	Pressure mm of Hg	Time (Days)
1	1	187,188	1
3	1	121,120	4
4	1	265	35
5	1	84,119	12
5	1	82,109	27
5 (Note)	1.2	111,104	23
CaO-0.5% on Dust O		Too viscous to test	

*Acid No. of Varnish = 18.2

NOTE: All other paints developed gas pockets. This paint reached pressure of 105 mm after 14 days, then leveled off to end of test.

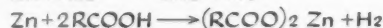
upon the amount of water in the system and also the amount of thinner used. For the linseed oil formulation, when the silicate is added in excess of 1.75% by weight of the paint (8.9% on the oil), drying time of the film is retarded but still meets specification requirements. For the alkyd, 2.5% silicate by weight of the paint (10.7% of alkyd resin solution) has been used without a noticeable change in drying properties.

Distillation of mineral spirits and tetraethyl orthosilicate indicates that mixtures in the ratio of 3:1 will produce the fastest drying paint films. The linseed oil formulation containing 5% silicate on the weight of the oil has an initial weight ratio of additive to thinner of about 1:1. The solvent system is now a ternary mixture of ethanol, a reaction product, TEOS and mineral spirits which apparently evaporates at a satisfactory rate. The ternary system has not been studied.

It may be of interest to know that the moisture content of a zinc dust-zinc oxide linseed oil paint containing 1.75% TEOS added to the finished paint contained only 0.007% water after one month at room temperature. This is the level at which moisture is adsorbed on zinc dust. No pressure had developed in the container during the storage period.

Conclusion

The major causes of gas evolution in zinc dust paints can be described by the following equations:



Gas evolution from the zinc dust-zinc oxide linseed oil paints can be effectively reduced by the addition of a water scavenger, tetraethyl orthosilicate, and fatty acid neutralizers, diethylene triamine or calcium oxide.

(Turn to page 80)

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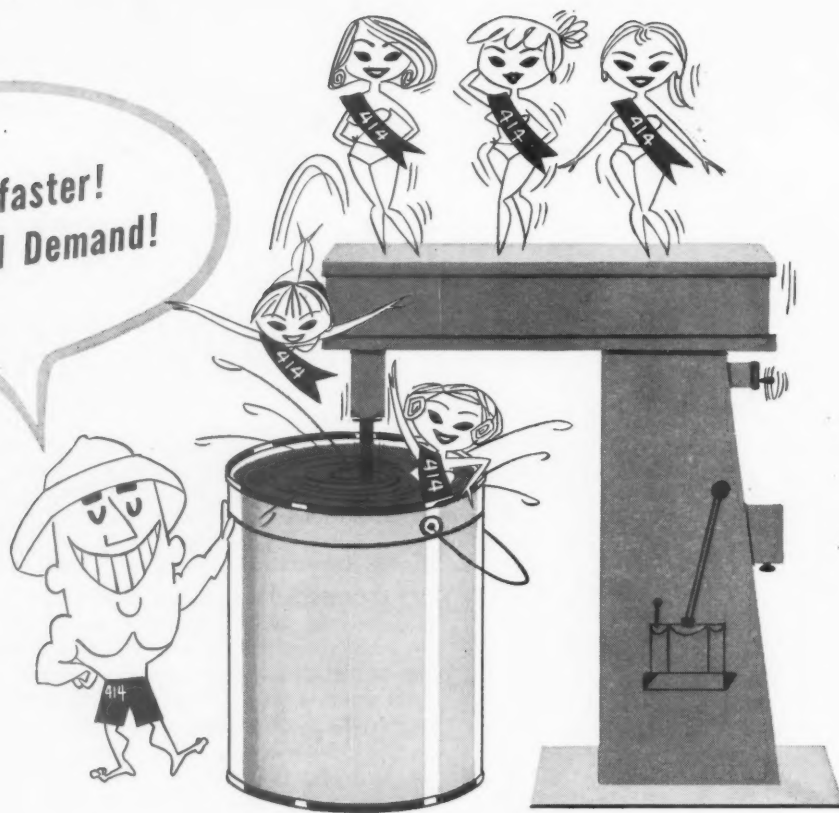
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ALKYD RESINS -- RECENT TRENDS

Part II—Anhydrides and Acids For Alkyd Resin Manufacture

RAW MATERIALS FOR THE ALKYD INDUSTRY Phthalic Anhydride

The phthalic anhydride picture, both from the point of view of economics and technology, has been so thoroughly discussed in the paint literature that very little need be said here. Current capacity for this important raw material in the United States is 510 million pounds per year and there is little question that this capacity will continue to rise. Thus, one estimate published in *Chemical Week* (Dec. 10, 1960) predicted that the demand for phthalic anhydride during 1959 was approximate 370 million pounds per year. Of this figure, some 44 per cent went to the alkyd resin industry. Thus, the trend in per cent of production consumed for the preparation of alkyd resins is downward. This follows since in 1954 approximately 140 million pounds of phthalic anhydride were consumed by the alkyd industry and this amounted to 58 per cent of the total produced.

Compensating for the decreased percentage consumption by the alkyd industry is an increased use of phthalic anhydride by the plasticizer industry. Thus, it is estimated that in 1959, 144 million pounds of phthalic anhydride was used for plasticizers. This approximates 39 per cent of the production.

The third important outlet for phthalic anhydride is for the preparation of dyes and pigments such as the phthalocyanine pigments. This use, it has been estimated, consumed approximately 33 million pounds of phthalic anhydride in 1959. The rapidly growing polyester field consumed another 29 million pounds in 1959 as compared to less than ten million pounds in 1954.

The phthalic anhydride industry is depending mightily on research so that the large production

capacity which exists may be utilized. Hopes for increased volume derive from developments now under intensive study such as alkyd resin emulsions, epoxy resin-alkyd blends, alkyd-polyvinyl acetate mixtures, blends of alkyds with other resins, such as those to be discussed later in this article, the development of new dyes based on phthalic, the development of plasticizers which will be useful not only for vinyls but for other resins such as acrylics, and of course the development of new polyesters.

The raw material situation is an interesting one and accounts in large measure for the fact that phthalic anhydride has been in short supply several times in the past decade, the most recent shortage having been occasioned by low steel production. The basic raw material for phthalic anhydride for many years has been naphthalene. Naphthalene availability has expanded as the steel industry has expanded since more steel mill capacity translates itself into more coke oven tar production. Naphthalene, of course, is an important constituent of coal tar. Thus, one prediction indicates that by 1965, 980 million pounds of naphthalene will be produced in this country. Add to this the material available from overseas and it is likely that by 1965 there will be sufficient naphthalene to produce 740 million pounds of phthalic anhydride. An estimated consumption figure for that year is 460 million pounds. Thus, on the basis of this optimistic estimate, the raw material situation is excellent.

Naphthalene from coal tar, however, is not the only source of raw material for phthalic anhydride. The petroleum industry also is capable of producing naphthalene. Efforts are now being made to produce petroleum naphthalene to help fill the gap caused by the current shortage of coke-derived naphthalene. Still another raw material of importance for phthalic

anhydride is ortho-xylene. Like naphthalene, this chemical may be converted to phthalic anhydride by air oxidation in the presence of a supported vanadium pentoxide catalyst at temperatures of 350 to 450°C.

There are currently at least nine important producers of phthalic anhydride. Three of these account for 60 per cent of the available capacity. These are Plastics Div., Allied Chemical Corp., American Cyanamid, and Monsanto Chemical Company. Other producers include Koppers, Reichhold, Sherwin-Williams, Oronite, National Aniline, and Pittsburgh Coke and Chemical Corporation.

As is well known, the price of phthalic anhydride plunged downward in 1958 by approximately four cents a pound to the unprecedented low of seventeen cents per pound. The price cut was precipitated by Amoco Chemical who stampeded the industry into lowering the price because of a projected production which amounted to only approximately four per cent of the industry's total. The Amoco process which uses ortho-xylene as a feed was said to present economic advantages which made this price reduction possible. Although all the producers immediately followed suit, the seventeen cent price was threatened approximately one year later when there were strong indications that it would go back up to nineteen cents per pound. The current price of phthalic anhydride is 20c/lb. for carloads, 21c/lb. for L.C.L.

Despite the intermediate shortages brought about by the present low steel production, there is no reason to believe that phthalic anhydride will not provide an important and readily available cheap raw material for the alkyd industry for many years to come. Its potential over-supply and potential low cost at the same time make it an attractive subject for research for new applications.

But what about other anhydrides or dibasic acids of interest to formulators of alkyds. Several are now available and many more are on the horizon. Let us look at some of these.

Isophthalic Acid

Chemically, there are two possible isomers of phthalic acid which is benzene with two carboxyl groups in the orthoposition. Because these carboxyl groups are adjacent, their configuration in space is such that a molecule of water may readily be removed from them with the net result that phthalic acid is more readily available, not as such, but in the form of its anhydride. If the two carboxyl groups are in the meta position, the product is known as isophthalic acid. Here anhydride formation between the two carboxyl groups cannot take place readily as can be seen if one builds a model of the molecule.

The third possible isomer is the one in which the two carboxyl groups are in the para-position. This product is known as terephthalic acid. Unlike isophthalic acid, terephthalic acid has not been proposed as an important ingredient for alkyd resins, largely because of its cost which is considerably higher than that of phthalic anhydride or isophthalic acid. Even so, terephthalic acid is produced in large quantities in a very high degree of purity because it is the major component of polyester polymers such as those exemplified by Dacron and by the film, Mylar.

Isophthalic acid, on the other hand, may be produced relatively cheaply by the oxidation of meta-xylene by a procedure pioneered in this country by the Oronite Chemical Company. Amoco now has also announced its intention to produce this material and thus there is a projected capacity for isophthalic acid of approximately 100 million pounds per year. This approximates twenty per cent of the capacity available for phthalic anhydride.

The price of isophthalic acid was lowered in 1958 in the same way that the price of phthalic anhydride decreased. Thus, the announced price in 1958 by Amoco Chemical Company was 15.2 cents per pound as compared to the then current price of 21 cents per pound. The price has since drifted back to sixteen cents per pound.

It is interesting to note that the Amoco process for production of phthalic compounds is a liquid phase air oxidation of xylene isomers. Thus, one obtains from it a mixture of phthalic anhydride, isophthalic acid, and terephthalic acid. The Oronite process, on the other hand, is said to make use of pure isomers obtained by fractionation. It follows, of course, that in the Amoco process, which depends on a bromine-containing catalyst, the products which result from the oxidation must be fractionated. Also, the isomers must be present in a ratio which will provide the proper amounts of oxidation products. If they are not present in the proper ratio, then the mixture must be enriched with pure components.

Isophthalic acid may be used in alkyd cooks in very much the same basic manner as phthalic anhydride if one recognizes several fundamental but relatively minor differences. First of all, since, as noted above, isophthalic acid is always available in the free-acid form, an extra mole of water must be removed. Correspondingly, the molecular weight of isophthalic acid is eighteen higher than that of phthalic anhydride and this must be taken into consideration in the stoichiometry of the alkyd resin. Because anhydrides react more rapidly than free acids, the rate of reaction of isophthalic acid at the start is somewhat slower. On the other hand, the isophthalic acid has less tendency to sublime and demonstrates greater heat stability. Isophthalic acid, because of its greater stability and less tendency to sublime or otherwise become unavailable, has a slightly higher functionality than phthalic anhydride. This means that alkyds produced from it tend to have a higher viscosity. Producers of isophthalic indicate that an oil length ten to fifteen per cent longer can be realized with isophthalic acid while still achieving a desired viscosity.

Processing with Isophthalic Acid

A large amount of information has been published on the use of isophthalic acid in alkyds. Suffice it here to say that suppliers point out that somewhat different techniques are required in alkyd formulation if the optimum properties of isophthalic acid are to be realized. Thus, it is not enough merely to replace phthalic anhydride with isophthalic acid. Rather, the producers recommend a new procedure which involves the formation of a linear chain, as the first step, by interacting isophthalic acid with a glycol such as ethylene glycol. The resulting linear polyester is then

modified by the addition of more highly functional alcohols such as glycerol or pentaerythritol and by fatty acids or drying oils. By preparing the alkyds in this fashion one is said to obtain more uniform and higher molecular weight products with the result that high viscosity is possible even at relatively low solids contents.

A typical formulation in which the above technique would be utilized and which would provide a product with an oil length of 53 per cent might include 498 parts of tall oil fatty acids, 108.4 parts of pentaerythritol, 58 parts of ethylene glycol, 71 parts of 1,2-propylene glycol, 379 parts of isophthalic acid, and 0.6 parts of litharge catalyst. An added virtue which is claimed in compositions such as these is that it is possible to use inexpensive tall oil acids with good results rather than the more expensive vegetable based acids such as those derived from soybean or cottonseed oil.

Vehicle for House Paints

As indicated above, house paints provide a large area for utilization of alkyds. Isophthalic producers urge that their product be used in the formulation of alkyds for house paints where they claim improved gloss retention, improved flexibility and adhesion, greater resistance to growth of microorganisms, and the ability to formulate paints without zinc pigments, but only with mildewcides. In addition, they claim improved brushing characteristics over phthalic anhydride-based alkyds and better adhesion to old zinc-containing paints especially where moisture conditions are adverse. The recommended alkyds for house paint have oil lengths in the range of 85 to 95 per cent and manufacturers suggest that they be used as the total vehicle.

Manufacturers of isophthalic alkyds for house paints stress particularly durability, better film toughness, higher gloss retention, and longer life, the latter two factors deriving from the improved ability of the paint to resist the elements.

They point out that in white house paints exposure tests frequently indicate that the isophthalic alkyd formulated paints have a poor overall rating because they resist chalking and erosion and self clean-up. Thus, the good properties of low chalking, less cracking, and better natural resistance to mildew reflect themselves frequently in a poorer overall appearance of a white house paint. However, manufacturers believe that formulation with pigments which will give freer chalking can solve this problem in whites. This situation is not observed in colored paints where the better color retention and the absence of chalking leads to better gloss retention and a higher degree of film integrity.

It is interesting to note that as early as 1952 Lum and Carlston published a paper on isophthalic acid in polymers in *Industrial and Engineering Chemistry* [44, 1595, (1952)]. In 1957 Wampner published an article in *Paint and Varnish Production* (November, 1957, p. 29) designed to discuss the chemistry of isophthalic acid and its formulation into various types of alkyds. A considerable body of literature in this area continues to be published as paint chemists become more familiar with this new raw material.

The other important market projected for isophthalic acid is in the formulation of polyesters where

it appears to have been accepted more rapidly than it has in the alkyd field.

Maleic Anhydride

Maleic anhydride is the product which results from the vigorous oxidation of benzene. Unlike phthalic anhydride or isophthalic acid it has no aromatic character. On the other hand, it has a highly activated double bond. This high degree of activation results because the double bond is beta to the two carboxyl groups. These, like the ones in phthalic acid, prefer to exist because of their proximity in the anhydride form. The activated double bond of maleic anhydride is important because it is an additional source of functionality and provides a basis for copolymerization of maleic-containing resins with vinyl monomers such as styrene. It is this property which makes maleic anhydride an important constituent of polyesters which are subsequently converted into thermosetting materials by copolymerization with materials like styrene.

Not only may this highly activated double bond be copolymerized with styrene but also it reacts with the unsaturated functions in the fatty acid portions of the alkyd resin. Naturally, the quantity of maleic anhydride must be carefully controlled because of its higher functionality which will ultimately lead to gelation. Accordingly, one normally does not replace more than fifteen per cent of the phthalic anhydride required with maleic anhydride unless one is formulating very long oil alkyds. Maleic-containing alkyds, in general, dry faster than corresponding straight phthalic alkyds and provide harder films.

Thus, in addition to alkyd resin formulation, maleic anhydride finds an important outlet in polyesters. It is also useful in the preparation of improved drying oils, for when maleic is heated with an unsaturated drying oil such as soybean oil or linseed oil, it copolymerizes with the oil by one of several mechanisms to provide a copolymer with improved properties in the areas of fast dry, film hardness, and film resistance.

Although maleic anhydride is used in alkyd formulation to a much lesser extent than phthalic anhydride, in part because of its higher price, it confers certain advantages to the alkyd formulation. These include higher viscosity which may be traced to the higher functionality of the maleic.

By way of a quantitative comparison, fourteen million pounds of maleic anhydride were consumed for alkyd manufacture in 1958 and approximately two million pounds were utilized for the modification of drying oils. It is estimated that in 1959 alkyd resin manufacture made use of fifteen million pounds of the product and a maximum of eighteen million has been projected for use in 1965.

1959 saw a decrease in price of maleic anhydride by eighteen per cent to a tank car price of 22½ cents per pound.

Currently, total United States capacity for maleic anhydride is estimated at 65 million pounds per year. Allied Chemical Corporation is the major producer, Monsanto Chemical Company is second with a capacity of twenty million pounds per year once a projected expansion has taken place. Reichhold Chemi-

(Turn to page 81)



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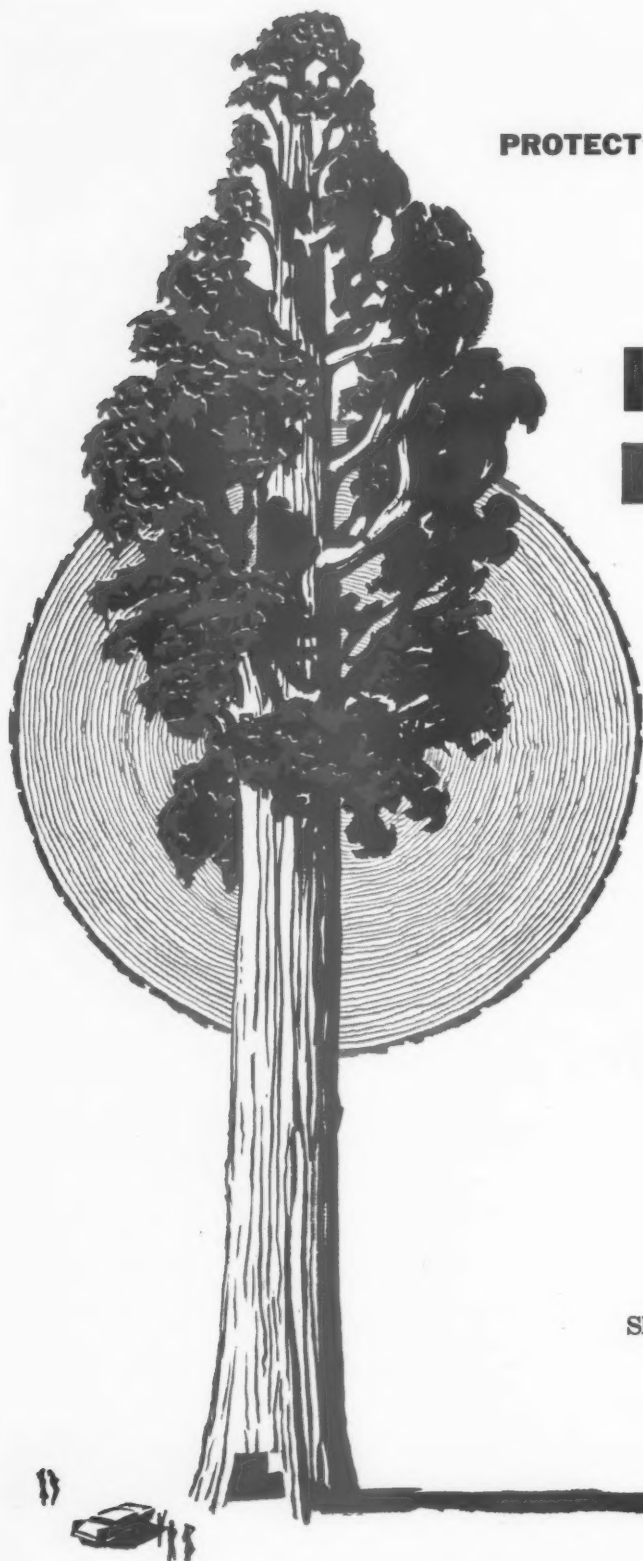
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By
E. R. Wells*

COATING technology has made noteworthy advances in many areas of application in the past few decades, yet the formulation of clear varnishes for exterior exposure on wood surfaces does not appear to have kept pace with improvements in other coatings. For example marine spar varnishes which have represented the ultimate in durability for many years are still largely based upon the usage of 100% phenolic resins and china wood oil, neither of which are low cost items and which command very high prices as yacht varnishes in the best qualities. Lower cost varnishes containing modified phenolics, alkyds, rosin esters and other lower cost resins are being sold for the varnishing of house siding, with a corresponding diminution of durability.

Durability on Wood

Reference has been made (1) to the excellent durability of urethane varnishes on wood in demanding Florida exposures. Further work reported herein has confirmed fully the outstanding performance of certain two-package urethane varnishes in comparison with the highest quality orthodox marine varnish obtainable. In addition a lowering of costs was achieved by the use of blown castor oils instead of the more expensive polyesters previously recommended. Finally, excellent performance was maintained not merely for regular lumber commonly used for boats, such as mahogany, but also for woods notoriously difficult to finish satisfactorily, such as redwood and southern yellow pine.

Included in this series were eight two-can urethane coatings, two commercial spar varnishes and a long-oil alkyd varnish. Four of the urethanes were based on blown castor oils of different types since earlier work (4), (5), (6) had shown these to possess a number of desirable properties, such as high gloss, gloss-retention, excellent abrasion-resistance, low isocyanate demand, and excellent flow and levelling characteristics. An unblown castor oil was also included as was a varnish based upon a low-cost polyether prepared as an -NCO terminated prepolymer, ($\text{NCO/OH}=2.0$), subsequently crosslinked with a tetrafunctional pro-

pylene oxide derivative of ethylene diamine to an ultimate $\text{NCO/OH}=1.1$. Two of the systems were based on polyester/polyisocyanate combinations since previous work (1), (4) had shown good performance of a moderately branched polyester "Multron"*** R-12 on outdoor exposure on mahogany and some other woods. In this study the coating was made more flexible by reducing the overall branching in the polyester by replacing part of the R-12 ("urethane-polyester 1") by an equal-parts blend by weight of R-12 and an almost linear polyester Multron R-18, "urethane-polyester 2." Three coats of each system were applied with overnight drying between coats. The Florida exposure was at Miami in marine atmosphere facing south at 45° for twelve months.

Results are summarized in Tables I-IV for each wood individually and for all three woods considered together. Since the ratings were based on subjective estimates of performance with 10 indicating no visible deterioration, differences of one unit were generally considered the minimum distinguishable between adjacent panels. However in some instances differences of one half-unit were considered admissible.

The primary purpose of this paper is to call attention to some outstanding performances of the blown castor oil systems. As the four different types of blown castor performed almost equally well as a class they were grouped together and averaged, giving some ratings containing one quarter-unit which was rounded to .3. It is suggested that from the recognized limitations of subjective ratings, broad classifications are most appropriate and indicate performance as:-

Rating of 7 and higher indicate "satisfactory" performance through "very good", up to "no visible deterioration".

Ratings between 4 and 7 indicate "moderate" to "fairly good" performance.

Ratings below 4 indicate "inferior" performance to "complete failure".

The incidence and type of failure on each type of coating are discussed and illustrated below.

*Mobay Chemical Co., New Martinsville, West Virginia.

***Mobay Chemical Co., registered trade mark, U. S. Patent Office.

Table I		
Southern Yellow Pine		Rating
Urethane-blown castor oils		5.3
Urethane-refined castor oil		4.0
Urethane-polyether		3.0
Spar varnish No. 2		1.0
Urethane-polyester 1		1.0
Urethane-polyester 2		0
Spar varnish No. 1		0
Alkyd varnish		0

Table II		
Redwood		Rating
Urethane-blown oils		7.5
Urethane-refined castor oil		7.5
Spar varnish No. 2		4.0
Urethane-polyether		3.0
Urethane-polyester 2		2.0
Spar varnish No. 1		1.0
Urethane-polyester 1		0
Alkyd varnish		0

Table III		
Mahogany		Rating
Spar varnish No. 2		9.0
Urethane-blown castor oil		8.3
Urethane-refined castor oil		7.5
Alkyd varnish		5.0
Urethane-polyester 1		4.5
Urethane-polyester 2		2.0
Spar varnish No. 1		1.5
Urethane-polyether		1.0

Table IV		
Average of All Woods		Rating
Urethane-blown castor oils		7.0
Urethane-refined castor oil		6.3
Spar varnish No. 2		4.7
Urethane-polyether		2.3
Urethane-polyester 1		1.7
Alkyd varnish		1.7
Urethane-polyester 2		1.3
Spar varnish No. 1		0.7

Urethane-Blown Oils

The principal differences between the blown castor oils were in their viscosities which varied between 8.1 and 372 stokes. Since the refined castor oil also performed excellently, the extent of blowing does not appear to modify performance appreciably. However, the unblown oil requires the addition of a flow control agent such as cellulose acetate butyrate, whereas this is unnecessary with the blown oils. Correct viscosity for application is also readily obtained by proper selection of blown oil used. Film-levelling, general appearance and abrasion-resistance are again optimal with the blown oils.

After exposure gloss retention of the castor oils ranged generally from fairly good to very good. Although there was slight flaking at the unsealed edges of some of the panels this did not exceed one-quarter inch and the films were entirely free from general cracking or even microscopic checking. This is illustrated in Figure 1 on southern yellow pine. Even on redwood, another wood notoriously difficult to coat, the blown-oil coating remained intact across the severe swelling of the face grain which occurred during exposure, as shown in Figure 2.

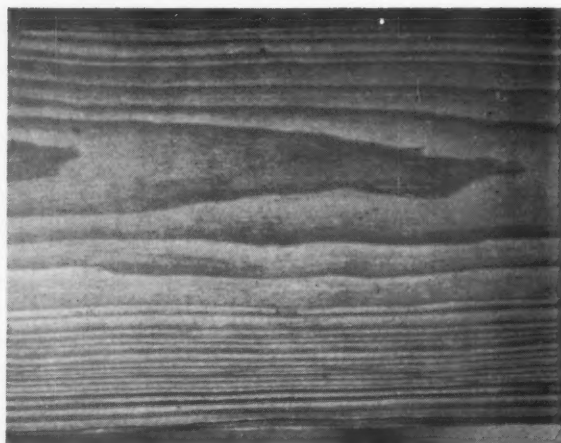


Figure 1. Blown castor oil urethane on Southern Yellow Pine. (Magnification X 3/5).



Figure 2. Blown castor oil urethane on Redwood. (Magnification X 4/7).

Spar Varnishes

Spar varnish No. 1 was expected to be the outstanding control vehicle since this is an internationally known product commanding a high price. However in these tests spar varnish No. 2, a much less well-known product manufactured by another company performed considerably better. This latter varnish failed by rather severe edge flaking (up to three-quarters inch), and rather inferior gloss retention. Spar varnish No. 1 failed on each substrate by severe checking, cracking and even flaking over the entire panels as illustrated in Figures 3 and 4.

Urethane-Polyether

This coating rapidly lost gloss on exposure and accumulated a deposit of scum and salt-spume. Microscopic examination of the returned films showed formation of a highly-reticulated surface but the films remained intact across the panels without the checking or cracking characteristic of the spar varnishes. Control panels containing ultra-violet absorber did not noticeably improve gloss retention. In further work on this type of coating anti-oxidants as well as UV absorbers will be incorporated in efforts to improve the appearance of this low-cost type of coating.



Figure 3. Spar varnish on Southern Yellow Pine. (Magnification X 1 1/4).

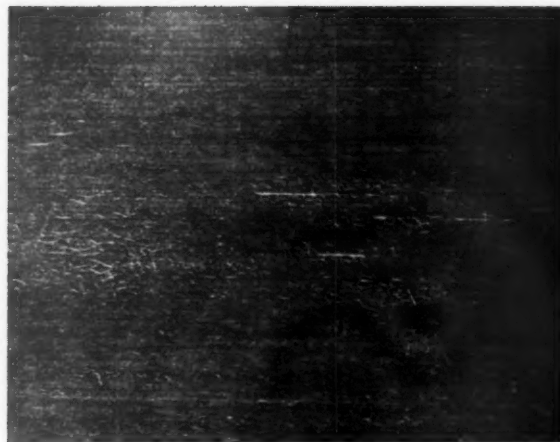


Figure 4. Spar varnish on Redwood. (Magnification X 1 1/4)

Urethane-Polyester

In efforts to further improve the performance of polyester urethanes on "difficult" woods such as redwood it was thought that a more flexible coating might be desirable. However replacement of part of a moderately branched polyester by a more linear resin lowered the photochemical resistance of the system and failure by checking, cracking and flaking was noted. Where chemical resistance is an important consideration the more-branched polyesters are to be preferred even to the blown castor oil systems. Excellent results were obtained previously with moderately branched polyesters (1).

Alkyd Varnish

The vehicle employed was a well-known commercial alkyd resin containing 65% soybean oil and 24% phthalic anhydride reduced with mineral spirits and containing lead and cobalt driers. Failure was by whitening, flaking and cracking as illustrated in Figure 5. Large cracks are clearly visible in the center of each end of the panel area shown. Whitening is shown at the top and bottom of the photograph particularly at the edges. Flaking is shown by the small elongated white marks distributed over most of the area shown.

Formulation

A typical formula for durable marine varnish based on blown castor oil with polyisocyanate is given in Table V. The simplicity of preparation is another

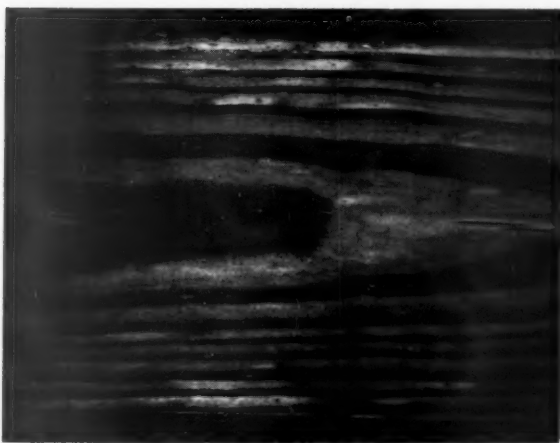


Figure 5. Alkyd on Southern Yellow Pine. (Magnification X 4/7)

noteworthy feature. A formula for a clear wood coating based on polyester will be found in the reference¹ cited (p. 1204). Further details on the principles of formulating with urethanes may be found in reference⁴.

¹Suitable blown oils are No. 15, No. 30, No. 40, Baker Castor Oil Company^{2,3} and W-1, OX-50, OX-55, Z-5, Spencer Kellogg and Sons, Inc.³

²Urethane grade, Union Carbide Corp.

³Mobay Chemical Company

⁴Viscosity obtained with OX-50. Other oils will vary correspondingly.

The blend of packages 1 and 2 will increase in viscosity progressively during an eight-hour period after mixing but should not gel in the can within that time at 70-80°F. Application may be by brush, roller or spray.

Acknowledgement

Acknowledgement for considerable assistance in the preparation and application of the coatings is gratefully made to G. F. Knisley, and for photographic assistance to Dr. S. Steingiser and C. Crookshanks of Mobay Chemical Company.

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- (1) Wells, Hudson, Saunders and Hardy, *Official Digest*, **31**, No. 416, 1181. (1959).
- (2) "Castor Oil Products for Urethane Polymers": Baker Castor Oil Co.
- (3) *Catalogs of Castor Oils*: Baker Castor Oil Co.; Spencer Kellogg and Sons, Inc.
- (4) Wells and Hudson, *Paint, Oil and Chemical Review*, **122**, No. 20, 8, (1959).
- (5) Patton, *Paint Industry Magazine*, **74**, No. 9, 15, (1959).
- (6) Patton and Metz, *Official Digest*, **32**, No. 421, 222, (1960).

Table V

Package I	Parts by Weight
Blown Castor Oil ¹	29.9
Cellosolve Acetate ²	18.3
Xylol	18.3
	66.5
Package 2	
Mondur CB-60 ³	33.5
	100.0
NCO/OH	1.1
Non-volatile, %	50
Viscosity, Np. 4 Ford cup, seconds ⁴	22
Weight per gallon	8.5

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By
Edward Anthony

The author expresses his random reflections on various aspects of the paint industry. The opinions contained in this column are his alone and do not necessarily reflect those of this publication.

THE dramatic and bewildering impact on a whole industry of the threat of technological obsolescence can lead only to two paths. Either their products succumb to the onslaught of time and progress and disappear into the limbo of the curio, or the industry will fight back and attempt to lift itself by its own bootstraps, back once again into a competitive position in the marketplace. In this volatile and dynamic period of rapid scientific and managerial achievement, many enterprises have already felt the bitter taste of having their product rendered outmoded by the progress of competitors.

A different aspect of this problem was presented by Theodore Levitt of the Harvard Business School, at the '60 annual meeting of The National Paint, Varnish and Lacquer Association. Mr. Levitt pointed out that there is a very real danger that failure can occur, not through being obsoleted, but rather because of lack of realization of what business is actually being engaged in! As a vivid, concrete example, the present plight of the railroads can partially be ascribed to that in-

dustry's belief that the public desired better railroad service when it really wanted improved *transportation*. Levitt summarizes his thesis in the thought that "selling focuses on the needs of the seller; marketing on the needs of the buyer."

Using this approach, our industry would stagnate if it looked upon itself as merely the producer and seller of paint or varnish or lacquer. We are really in the business of marketing protective and decorative systems. Ultimate competition comes from unexpected sources, the metals industry, the manufacturer of plastics, the producer of laminates and free films. The stultifying shackles of *product orientation* must be thrown off and a beat 'em or join 'em philosophy should be adopted. Let's see if we have—or can concoct—a product that will do a given job better; or let's get in on the ground floor and promote our organic coatings for use on or in these potentially competitive products, to upgrade them still further; or maybe we will have to expand our product lines horizontally—as many companies in

the finishes business have already done—to include the manufacture of those goods that might otherwise put us out of business.

Or we can develop new outlets for our products. A case in point within our own bailiwick is the result of the drastically changing consumption pattern of vehicles in trade sales finishes as a result of the introduction of emulsion paints. The use of oils in house paints, indoors and out, particularly those based upon processed linseed oils, have been hard hit by this technological change. The success of emulsion coatings is an example of a development more suited to the needs and desires of the buyer—it is *customer oriented*—than the older coatings they replaced.

But the oil processors are fighting back—in the scientific arena. The development of epoxidized oils as plasticizers and stabilizers for vinyl films is an example of this. Here is a team-up of one of the oldest film formers and one of the newest techniques of chemical reaction. The net result is a low cost, efficient component of particularly desirable properties for use in that portion of the end-use pattern that is the biggest consumer of plasticizers.

A second new outlet for oils and their derivatives is as a component in urethane coatings. These specialty products are one of the fastest growing classes of the ever-changing industrial finishes spectrum. By utilizing the unique hydroxyl-bearing structure of castor oil, either one- or two-component systems may be formulated which cure at room or elevated temperatures, depending on the specific type. By reacting drying oils such as linseed with diisocyanates an improved air drying coating may be formulated. This incorporation of isocyanates with oils to yield urethane coatings produces films whose qualities run the gamut from modified oils through alkyd vehicles to ultra-resistant appliance enamels.

The incorporation of tung oil into polyesters is a third method of utilizing the naturally occurring drying oils in coatings systems which emphasize a new approach to customer problems. F. B. Root and R. W. Amidon in their *Modern Plastics* article (October, 1960), "Tung Oil and Its Derivatives in

Polyesters," point out that in addition to modifying the characteristics of conventional polyesters for use in structural components (when properly reinforced), a unique curing mechanism has been discovered for thermosetting coatings: "The partial reaction product of more than 12% of tung oil with a glycol maleate is a heat-convertible resin. . . hardening is by way of the Diels-Alder reaction. No volatile material is given off as in a condensation reaction such as esterification." Of further import is the observation that the addition of driers promotes wrinkling.

And fourth, but by no means least, is the development of linseed oil-in-water emulsion house paints. The Department of Agriculture's Northern Utilization Research Laboratory at Peoria, Ill., is responsible for this newest house paint product which has such attributes as easy applicability and clean-up, extremely rapid development of water resistance—15 minutes, recoatability in one-half hour, and good adhesion to chalky surfaces—a difficult problem with the conventional emulsions. This is certainly attacking the problem of obsolescence at the source!

But remember this approach is only half the problem. The other side of the coin is to create a package that satisfied a need of the customer/consumer in a better way than any other type of product can. It is not mere *paints* we are selling, but rather a *protective, decorative and utilitarian scheme* which will enhance the esthetic and beneficial values of the coated object.

Promotion

IT would seem that, in addition to desire for a product by virtue of its very existence, today's marketing approach is highly dependent upon *creating desire and need* in the potential buyer. The stimulation of sales through the medium of advertising depends on the almost magical power of this growing industry. In newspapers and magazines, *via* radio and television, by mail and billboards, advertisers pour forth their messages. The past decade has seen yearly expenditures double to a fabulous \$11 billion in 1959.

The mystical yet powerful impact of some advertising defies analysis, yet it does the job of ten times as much money channeled into dull, uninteresting campaigns, that somehow miss the mark. Advertising is a most important way for our industry to promote the advantages to be gained from the use of its products. Consumers have come to expect that almost unbelievable decorative and protective powers reside in our oh-so-thin coatings—and they are right! What better or more rapid way is there to dress up the drab, be it building, furniture or toy? What other products lend themselves so readily to the ministrations of the maladroitness? As an outlet for expression and evidence of aspirations, a fresh coat of paint works wonders. What else could typify the new appliance, the new home, the new car, as well as the gleaming, clean, obviously inherently protective surface finish?

Thus paint occupies a unique niche. It is difficult to categorize this product. But, one *could* use wallpaper or vinyl coated fabric for wall covering. The consumer *might* prefer a brick home—if it can be afforded—to metal or wood siding, or stucco, all of which utilize organic finishes. And there are still some properties of porcelain which *perhaps* are more desirable than those imparted by our present industrial coatings.

There are areas where true advances and achievements must be promoted through educational advertising.

The impact of color consciousness has been one of the greatest subliminal promoters of our products during the past decade. And to the credit of our industry, we have emphasized the use of color, not for its own sake, but in the overall scheme of things, whether it be for decoration, safety, or merely as a method of self-expression.

From a *buyer oriented* viewpoint, our marketing problems revolve around building into paint increased versatility, durability and ease of applicability, so that coatings may meet the challenge of the finished effect produced by other means. For example, still further improvement in the scrubbing resistance of flat interior wall finishes is desirable; up-grading of chip and

abrasion resistance of enamels is essential to meet the standards of competitive materials; the development of a container having superior opening (and closing) characteristics over the conventional friction lid is essential. You can think of many more.

This aspect of promoting our industry—through *customer oriented* thinking and products—is the *only* way we will successfully compete with other, equally aggressive approaches to improving the physical world around us.

Radiation

STUDIES of the effects of radiation on chemical compounds are one of the "side reactions" of the massive scientific effort aimed toward the peaceful use of atomic energy. J. G. Carrol and R. O. Bolt summarize a portion of the findings to date in *Nucleonics* (August, 1960), in their article, "Radiation Effects on Organic Materials."

Some of their more general findings include: "Radiation changes organic substances by two main routes—crosslinking (polymerization) and scission (cleavage). . . . Molecular structure is the largest factor influencing radiation stability, which varies 1000-fold among organics. The most stable compounds contain aromatic rings; least stable are those having non-aromatic unsaturation. . . the gross effects of radiation. . . depend only on dose and are independent of dose rate. . . . Radiation does not change all properties of an organic material to the same degree."

To put the relative sensitivity of organic materials into perspective, consider that exposure to 10^3 rads is lethal to man and that most ceramics and metals are usable above 10^{12} rads. Such materials as elastomers and plastics are initially affected at 10^6 rads as evidenced by softening, are usable up to 10^7 , but start to embrittle and lose tensile strength and elasticity in the 10^8 – 10^9 range.

Potentially important results of controlled radiation include the formation of new copolymers, particularly by grafting, and the improvement of specific properties of high polymers, such as the five-fold tensile strength increase of polyethylene at low irradiation levels.



**"Colonel Billy Hood"
Sees Industrial Growth
Spurring Southern Sales**

SOUTHERN paint makers will gather in Atlanta on March 15 for a three-day meeting and paint exhibit. Among those sure to attend will be the popular William "Billy" Hood, President of Industrial Paint Manufacturing Co., Birmingham, Ala.

Mr. Hood entered the paint business shortly after graduating from the University of Alabama in 1921. It was at this time that synthetic resins such as vinyls, acrylics, etc. were laboratory curiosities. Of passing interest, it was in the early thirties that alkyd resins made some very significant strides. The introduction of air-drying alkyds and the development of baking type alkyd enamels with improved blister-resistance and color are two examples.

In 1947, Mr. Hood helped to organize Industrial Paint Manufacturing Co. of which he is now president. The firm's manufacturing facilities are located in Birmingham with sales activities extending throughout the deep South.

Mr. Hood feels that the span of the last ten years represent the greatest period of technological growth for the paint industry. This period was studded with such accomplishments as latex emulsion paints, water-soluble paints, epoxy, polyurethane, and polyester finishes—all of which are now providing the user with products having vastly improved properties. The continual introduction of new solvents, resins, pigments, and intermediates have greatly extended the formulator's scope in developing finishes to meet any requirement.

The paint industry below the Mason-Dixon line is reaping the benefits of the rapid industrial growth which has been taking place in the South since the end of World War II. New industries have spurred residential construction in many Southern areas. This rise in housing is reflecting greater paint sales.

Those industries which have "set up shop" in the South do not consume large volumes of paint as most of them are chemical

plants and textile mills. However, considerable paint is needed to protect these facilities, creating quite a demand for industrial maintenance paints.

In analyzing the present position of the Southern paint industry, Mr. Hood is quick to point out that paint manufacturers in the South enjoy a consistently healthy business throughout most of the year because the industry is not tied to any seasonal painting period or the varying demands of automobiles and appliances which the Northern manufacturers experience from time to time.

Conductor of the "Colonel Billy Hood" forums, Mr. Hood is well-known throughout the South. He has been President of the Southern Paint & Varnish Production Club, has held various positions in the National Paint, Varnish & Lacquer Assn., and is presently serving as Chairman of the Board of Directors of the National Association.

When his heavy schedule permits a bit of relaxation, Mr. Hood spends his time on the track—racing sports cars.

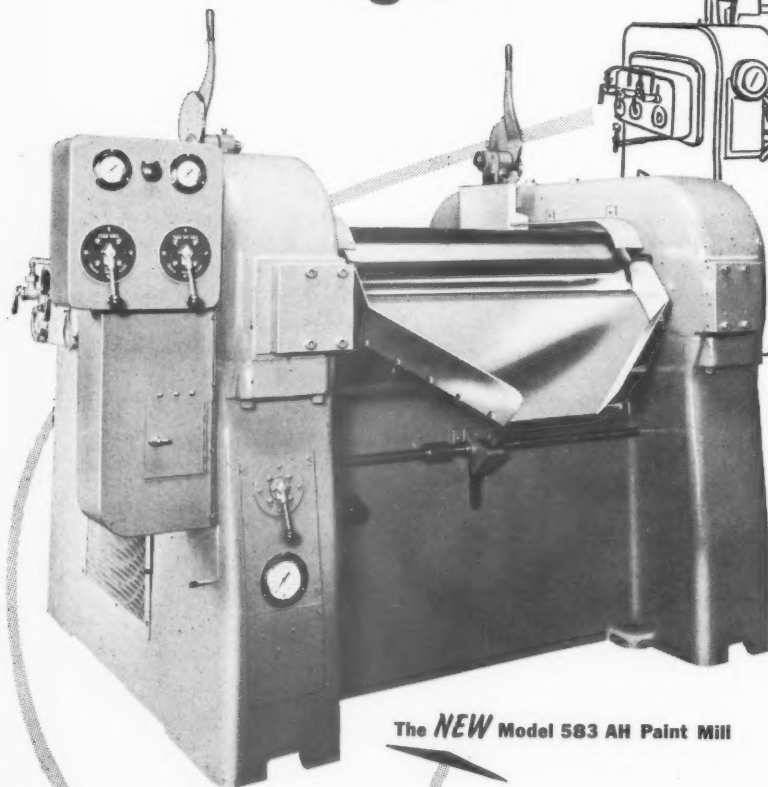
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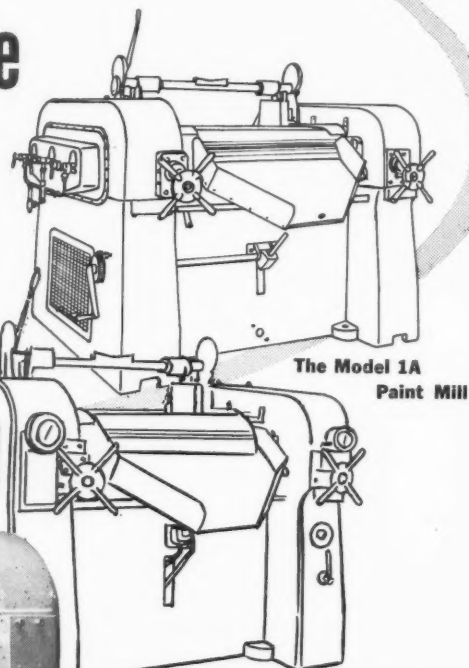
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Now Lehmann offers the new Model 583 AH, a completely hydraulically controlled paint mill of the newest design. In this the control points have been reduced from four to two. Adjustments are made by pressing a mushroom type button. The center roll is fixed, only the two outer rolls being movable to adjust pressures. A flick of a valve handle activates the Float-O-Matic feature introduced by Lehmann some years ago.

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A study of the nature and cause of fork truck failures shows that 10 percent of the failures are due to carelessness. A checklist discussing ways to kill or cure a fork truck is presented on page 54.





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CONTROL PROVIDES ACTION

By
Lawrence Shatkin

I LIKE to think of control as one of the elements of management which focuses on immediate or future action. There is another school of thought which interprets control in the Fayolian sense. M. Henri Fayol, the French industrialist and noted management authority, used the word "controler" to mean measure, verify, or compare. However, the word used in technical and management circles imply that control means to observe deviations from a predetermined standard, and taking action if and when necessary. The other important elements in the understanding of control are what is to be controlled, and who is to do the controlling? The control element of management enables us to determine what progress has been made, and whether a change in plan or strategy is necessary.

Essence of Control

The importance of good organization to control is recognized when we consider control as a continuum, and include the review and analysis of people. We have to concentrate on identifying what has to be controlled and who will be responsible for it.

The opinions expressed in this feature are not necessarily those of any particular firm or organization.

Personalized Suggestion Program

If we view control as the concern of all of the functions of a business, affecting all employees, a personalized suggestion program is invaluable in attempting to gather untapped reservoirs of ideas, diagnose prevailing attitudes, and give each employee an opportunity to speak whatever may be on his mind. This program should be tackled vigorously. It will bring to the surface many things that would otherwise go undetected until new contract negotiations were due. At that time many unnecessary roadblocks arise, and emotions are higher they should be.

Control, as exemplified by such a program, concerns the review and analysis of the attitudes and performance of people. If we want to find opportunities for improving control we must examine all of the principal control devices being used.

External and Internal Reports

Reports approved by top management and issued in concise form to the public are thought of as external reports. Most common are reports to stockholders describing balance sheets, operating statements, yearly comparisons, and profit and loss statements.

There are many internal reports issued, and each one is designed to

fit a specific need or purpose. There are numerous sales reports, production reports, and budgetary control reports.

Timing is very important in issuing these internal reports if they are to be effective and contribute to better company performance.

Internal Auditing Control

It is important to distinguish what is an accounting function and what is a management control function. Internal auditing belongs to the latter group, and this concept will become more prevalent when the gap is closed between management and accountancy. All control figures should be produced for guiding policy and action, and the report should be used.

Internal auditors afford an independent appraisal of management, policies, and procedures. Their function is to measure and evaluate all other controls, and always focuses on the future.

The objectives of a management audit are to increase the effectiveness of the company by revealing any weaknesses, and finding means for its improvement. This device of business management is similar to the concept management by objectives in that the check by top management on itself and its subordinates becomes a measure for self-improvement. All major business policies undergo penetrating professional analysis by specialists of the different functions.

The Function of Policies

A policy is a statement of principle, so concisely worded, that anyone confronted with the same set of facts will arrive at the same conclusion. This being the case, policy becomes an important factor in management control. Policies affecting the several activities and relationships of the business should be in writing to assure uniform interpretation, for without uniform interpretation and action they cease to be policies. If these policies are within the framework of sound principles of business organization, management controls will be simplified.

In Peter F. Drucker's book "The Practice of Management" he clearly states that the word control is ambiguous. He says, "It means the ability to direct oneself and one's

work. It can also mean domination of one person by another. Objectives are the basis of 'control' in the first sense; but they must never become the basis of 'control' in the second, for this would defeat their purpose."

The problem of control is to match the responsibilities of every key position by supplying whatever information is necessary. Delegation of responsibility must be practiced so every manager knows what his individual and company goals are, and what yardsticks will be used in evaluating his performance.

Management and Accounts

The relationship of those who are responsible for finance, accounts and costing to management generally is of central significance. Management and accountants must realize that the primary purpose of accounts and costs should be to guide the management in planning the future and in deciding from actual results what has to be done to make the plan work. The function of the controller is to establish, coordinate and maintain through authorized management an integrated plan for the control of operations.

Accounting records provide information to control and protect the assets of the business, to comply with city, state and federal government agencies, and to inform the owners of the business about their operations, and to assist them in planning and controlling their objectives, assumptions, and risks. The very nature of decisions imply risks because they always focus on the future.

The fact that the controller belongs among top management indicates the importance attached to his function and enables him to be effective. We must never forget that good organization is in itself one of the most effective means of control.

Alden Brett in the April 1, 1940 issue of the NACA Bulletin stated, "The function of control in the distribution field or any other field is not exercised by the accountant. Control is a function of management, of the men who have the authority to say 'yes' or 'no.' In the final analysis, management must control that which it creates."

• Sherwin-Williams uses **COLOR-EYE** in 3 different phases of their operation



RESEARCH and DEVELOPMENT

"COLOR-EYE is used in the selection of the most efficient color pigment combination for a given formulation and to obtain a spectral match for a color of unknown composition. It is also used to check and read the color stability of pigment combinations of proposed formulations."



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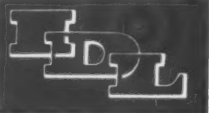


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13 WAYS

Would you pour water into a fork truck's gas tank? Would you send a fork truck out on a job without a drop of oil in it? Would you put anti-freeze into the radiator on a hot July day?

Maybe you wouldn't. But apparently some people do. According to *Clark Equipment Company*, major manufacturer of fork trucks, a study of the nature and cause of fork truck ailments referred to Clark's Service Division indicates that such antics are responsible for at least 10 per cent of fork truck damage.

The cause, obviously, is plain carelessness. And combatting carelessness is a difficult task. Rather than giving stern lectures and issuing dire warnings, Clark has taken the opposite approach and made available an "easy to follow checklist of things to do to kill a fork truck."

"Perhaps," Clark says, "by pointing out how easy it is to damage a fork truck through carelessness we'll reduce the 'human errors' that are costing industry thousands of dollars a year."

THE KILL

1. Ignoring the manufacturer's lubrication specifications is an easy and sure way of doing permanent damage to a fork truck. A clever trick is to use one kind of lube for *all* lubrication. Chassis grease, for example. This probably won't hurt the chassis but will certainly play havoc with the engine, steering gear, lift chains and other parts requiring lighter oils.

THE CURE

Be consistent about following the manufacturer's suggestions for lubrication, regarding both the type of lube to use and the frequency of lubrication.

THE KILL

2. When looking for a container with which to fill the gas tank, pick up the water can. But don't look inside. There might be an inch or two of water left in the can. If this is poured in the gas tank, eventually the engine will stop. Perhaps no serious damage will be done, but several hours might be spent looking for the trouble.

THE CURE

Use a can that's used for gasoline only, not water or oil. And make sure it's clean and dry; dirt in the gas tank will cause more harm than water.

THE KILL

3. The removal of both tilt cylinders for periodic inspection presents a fine opportunity for ruining the truck's upright. This can be accomplished by removing the cylinders without first securing the upright. When the second cylinder is taken out, the upright, having no further support, will crash to the floor.

THE CURE

Use a mobile crane, chain lift or some such device to secure the upright when the tilt cylinders are removed.



to kill a fork truck



THE KILL

4. Rubber gaskets and seals, although small, are important to proper truck operation. To hasten the failure of such parts, clean them in cleaning solvents with a mineral base. This will cause the rubber parts to become tacky, soft and swollen and generally unfit for use.

THE CURE

Clean rubber parts in denatured alcohol or some other non-mineral solvent.

THE KILL

5. If the master brake cylinder is scored and pitted, brake operation will be faulty. To do a good job of scoring the cylinder, polish it with emery cloth or sandpaper. These will permanently scar the cylinder.

THE CURE

Always use crocus cloth to clean cylinders of pressure marks and discolorations.

THE KILL

6. A crack in the cylinder block is usually considered major damage. To accomplish this, wait till the engine over-heats, then immediately pour cold water into the radiator. If the engine is hot enough and the water is cold enough, the cylinder may crack.

THE CURE

When engine overheats, do not add water until the engine has cooled. Then start the engine and add water slowly.

THE KILL

7. Cold weather provides excellent opportunities for damaging fork trucks. For example, if the cooling system becomes frozen solid, start the engine immediately and run it at high speed. This could cause extensive damage to the radiator, cylinder head, block and just about everything else.

THE CURE

Never start the engine when the cooling system is frozen. Tow the truck to a warm building and let it thaw completely.

THE KILL

8. Another cold weather trick is to add water to the battery when the truck is operating in freezing temperatures. Since the water can't mix with acid, it will probably freeze, perhaps cracking the battery case.

THE CURE

Let the truck, or at least the battery, warm up before adding battery water in very cold weather.



THE KILL

9. Additional damage to the battery can be done by always filling it full of water rather than just to the water line plainly marked inside each case. With too much water the battery will boil over readily, thus allowing battery acid to corrode metal parts.

THE CURE

Fill batteries with water only to the level indicated inside the case by the manufacturer.

THE KILL

10. When adjusting the distributor, don't worry about maintaining proper gap between points. A few tenths of an inch difference will throw the distributor off timing and effect the performance of the whole engine.

THE CURE

For smooth and reliable performance it is of utmost importance that proper point gap be maintained. (For measurement, a wire feeler gauge is more accurate than a flat gauge.)



THE KILL

11. Since moisture in the ignition coil will make the coil inoperative, always steam clean the coil, or better yet, dunk it up and down a few times in water. This will cause rust and corrosion and considerably shorten the life of the coil.

THE CURE

Never get an ignition coil wet. Use an air blast to clean out dust.

THE KILL

12. Upright damage can be accomplished nicely by neglecting to adjust tilt cylinders so that they give an equal degree of forward and backward tilt. If tilt is not equal, one cylinder will reach its travel limit ahead of the other cylinder, causing the upright to bind. Consistent wear of this type will permanently warp the upright.

THE CURE

Periodic inspection will indicate whether tilt cylinders are functioning equally. Deviations should be corrected immediately.



Pneumatic Tired Fork Truck

THE KILL

13. Through the simple expedient of keeping the fan belt too tight, there's a fine possibility of a) breaking the fan belt, and b) exerting enough side thrust on the water pump and generator bearings to cause premature wear.

THE CURE

Adjusted correctly, the fan belt should have about one inch of free play.



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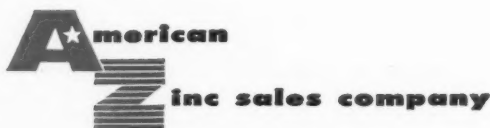
TYPE	AZO 50-L	AZO 35-L	AZO 35-M	AZO 18-L	AZO 18-L-S	AZO 12-L
	Cofumed	Cofumed	Blended and Acicular	Cofumed and High Basicity	Blended and Acicular	Cofumed
Consistency in Paint	Low	Low	Medium	Low	Medium Low	Low
Specific Gravity	5.95	5.85	5.85	5.75	5.75	5.70
Weight Per Solid Gallon (Pounds)	49.56	48.73	48.73	47.90	47.90	47.48
One Pound Bulks (Gallons)	0.02018	0.02052	0.02052	0.02088	0.02088	0.02106
Per cent Zinc Oxide (Approximate)	50	65	65	82	82	88
Per cent PbSO ₄ -PbO (Approximate)	50	35	35	18	18	12
Per cent Basicity (Expressed as Lead Oxide-PbO)	12-14	6.5-8.5	6.0-7.5	7-7.5	6-7	0.5-1.0
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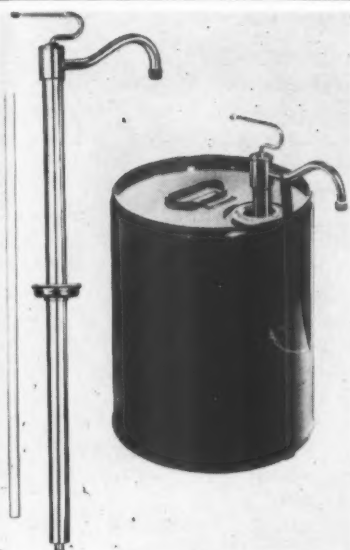
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NEW EQUIPMENT AND MATERIALS

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



MULTI-METER

DRUM PUMPS Self-Priming

New line of drum and pail pumps has recently been introduced.

The Model M45 pump has been developed as a modern method of easily dispensing liquid products from 5 and 6-gallon pails. It is self-priming and dispenses exactly 4 oz. per stroke. Small containers can be filled from 5-gallon pails without spilling or waste. It is easily installed and is adaptable to all size and type pail openings.

The Model M855 pump is designed expressly for use with 15, 30 and 55-gallon drums. This pump dispenses 8 oz. per stroke. It eliminates drum racking—drum requires less floor space and pump may be padlocked to eliminate possible misuse of drum contents.

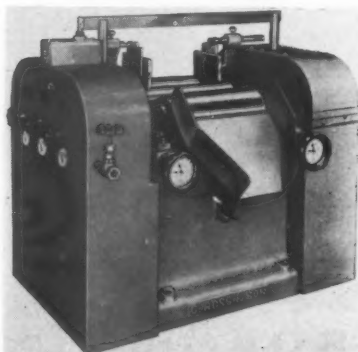
Both model pumps are constructed of rugged, machined steel. When roll temperature exceeds the temperature it is set for, the water

parts and are entirely nickel-chrome plated. They are self-venting and will provide leak-proof operation and long wear. Each pump is packaged in individual reshipper cartons, 12 to the case.

Multi-Meter Corp., Dept. PVP,
P. O. Box 6594-1635 Coining Dr.,
Toledo 12, Ohio.

ROLL MILLS Thermostatically Controlled

New high speed three roll mills fitted with roll pressure recording gauges and automatic thermostatic controlled water inlet valves have been introduced. These features incorporated into the mills give more precise control over roll adjustment and temperature for pro-



CHARLES ROSS

ducing the finest dispersions. The pressure recording gauges built into each adjusting handwheel assure positive parallel roll settings for uniform dispersions and eliminate uneven wear on rolls. The gauges enable returning to predetermined roll settings without guesswork, and insure the same results each and every time.

Mills in all sizes from 4½ x 10" to 16 x 40" are provided with automatic thermostatic control of main inlet or water cooling line for limiting the heat of rolls to a preset temperature between 40°-180°F.

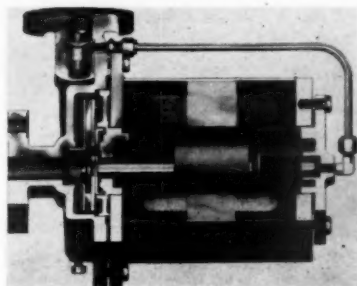
inlet valve is automatically opened to allow greater water cooling to reduce the roll temperature to the preset temperature.

According to the manufacturer these features have proved on many installations to give great quality control and uniformity of product; while also increasing production from the Mill. Further detailed information is available on request.

Charles Ross & Son Co., Dept. PVP, 148-156 Classon Ave., Brooklyn 5, N. Y.

CANNED PUMPS Long Bearing Life

New line of leak-proof canned pumps has exclusive automatic thrust balance design which is combined with larger bearings and more than triple radial bearing surfaces to give extremely long bearing life. Motor life of the new Series G pump is greatly extended by an oil filled stator cavity that dissipates heat from motor windings much more effectively than ever before possible. In addition to providing



FOSTORIA

longer maintenance-free pump life, these new pumps incorporate production techniques which enable them to be offered for sale at substantially lowered prices.

Company has field tested these new Series G features in over 100 installations during the past year. On this basis, the company is confident that these new canned pumps will practically eliminate the only two service points—bearing and

NEW MATERIALS — EQUIPMENT

motor windings—in a pump long known for its low maintenance burden in leak-proof pumping service.

Chemump Div., Fostoria Corp., Dept. PVP, Huntingdon Valley, Pa.

TERTIARY BUTYL PEROXIDE Polymerization Catalyst

Tertiary butyl peroxide is an excellent polymerization catalyst at temperatures of 212°F or over, and can be used to pre-catalyze solid resins having a melt index below 195°F.

It is also useful, in the production

of high molecular weight polymers such as polyacrylates, high styrene resins, polystyrene, polyisoprene, polymerized oils, vinyl silicones, styrenated alkyds, ABS resins, styrenated estrified epoxy resins and allyl polymers.

Tertiary butyl peroxide is readily soluble and contains a minimum of hydroperoxide impurities, as suggested by its low specific gravity at 20/20°C of .791.

U. S. Peroxygen Corp., Dept. PVP, 860 Morton Ave., Richmond, Calif.

CURING AGENTS

Amine-Terminated Aliphatics

Development of three new flexible curing agents for epoxy resins is announced. They are described as

amine-terminated aliphatics with controlled and limited functionality. Fewer sites for cross-linking means greater flexibility of the cured mass.

Experimental Hardeners X-3483.1, X-3483.2, and X-3483.3 are very low viscosity, almost colorless liquids. Company spokesmen suggest their use to control flexibility, viscosity, and exotherm in both conventional epoxy resins and new flexible epoxy resins. Particular application in epoxy coatings, castings, adhesives and laminates is expected.

Dow Chemical Co., Dept. PVP, Midland, Mich.

RED PIGMENT

Haze-Resistant Finish

A yellow shade toluidine red pigment for paints which produces a high-gloss, haze-resistant finish is now available.

Freedom from haze obtained with this new toluidine red is outstanding. In both the case of the higher gloss and the haze resistance, the effect of the vehicle is of such importance that tests should be made in the vehicle to be used.

The excellent light resistance, alkali resistance and hiding for which toluidine red pigments are known are also found in this new standard.

Pigment, Color and Chemical Div., Sherwin-Williams Co., Dept. PVP, 260 Madison Ave., New York 16, N. Y.

YELLOW PIGMENT

Acid-Resistant

New yellow pigment, Graphtol Yellow 4766-0, is recommended for use in printing, inks and plastics. Excellent resistance to acid, alkali, and soap are claimed for it.

Heat stability for one hour at 350°F. recommends it for vinyls, high density polyethylenes, or other operations where the processing temperatures do not exceed 350°-375° F., the company states. It is non-bleeding in polyolefines but does bleed in vinyls. Light fastness of Graphtol Yellow 4766-0 is excellent when compared with other Benzidine pigments. In mass-tone there is no visible change at 320 Fade-Ometer hours and in tint-tone no visible change at 160 Fade-Ometer hours.

Sandoz, Inc., Dept. PVP, 61-63 Van Dam St., New York 13, N. Y.



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Long Beach Office: 2828 Junipero Ave., Long Beach, Phone Nevada 6-3301

**NEW
MATERIALS — EQUIPMENT**

**DISSOLVER
Impeller-Type**

Specially designed and engineered for low to medium volume production requirements, a new dissolver, Super Series Model 515-VHV, is announced.

Applicable to a wide variety of chemicals, paints, inks, foods and similar products, the new 515-VHV is a high speed, high shear, impeller-type unit. It is capable of mixing, dispersing, deagglomerating, etc., materials up to 50,000 centipoises or more.

Powered with 10—15 H.P. motor, it will handle 50 to 200 gallon batches, depending on nature of product and processing required.

The unit is equipped with the firm's patented impeller, 10" x 13" in diameter as determined by motor size, and exclusive "M P D" Maximum Power Delivery variable speed transmission system which is capable of delivering over 90% of motor horsepower to the impeller even at slowest speeds.

It is fully instrumented, with built-in ammeter and tachometer.

Morehouse Cowles, Inc., Dept. PVP, 1150 San Fernando Road, Los Road, Los Angeles 65, Calif.

**VINYL DISPERSION RESIN
Good Viscosity**

Yielding high structures at low rates of shear and rapid gelation rates, a new stir-in type dispersion resin, vinyl resin QXKV-2, is now available for high quality coating and molding applications.

The new resin is designed for plastisol and high-solids, low-solvent organosol dip coatings, and gives exceptional performance in rotational and slush molding applications and in machine-applied coatings. Good viscosity stability is maintained in dip tanks and during slush molding recycling. Platisols based on vinyl resin QXKV-2 can be readily vacuum deaerated, will release air rapidly, and are less affected by humidity during the process than platisols based on other resins of this type. Heat stability is also superior.

Union Carbide Plastics Co., Dept. PVP, 270 Park Ave., New York 17, N. Y.



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PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries \$1.00 per copy) to the publisher.

Coating Composition

U. S. Patent 2,956,897. Alma L. Rushton, 5491 W. 4100 South, and Millard Rushton, 3802 S. 5200 West, both of Salt Lake City 15, Utah.

A heat and weather resistant paint, consisting of linseed oil, and finely divided molybdenite dispersed therein.

Coating Compositions

U. S. Patent 2,967,162. Joseph A. Vasta, Darby, Pa., assignor to E. I. du Pont de Nemours and Co., Wilmington, Del., a Corp. of Dela.

An interpolymers of 30-80 mol percent of styrene, 15-65 mol percent of ethyl acrylate and 5-25 mol percent of a half ester of maleic acid and at least one alcohol of the class consisting of primary and secondary monohydric alcohols free of non-benzenoid unsaturation, containing only carbon, hydrogen and oxygen, containing up to 18 carbon atoms and containing hydroxyl as the only functional substituent, prepared by (1) heating a mixture of styrene, ethyl acrylate and maleic anhydride within said molar proportions in solution in about 25%—400%, based on the weight of said mixture, of aromatic hydrocarbon sol-

vent for said mixture at a temperature of 125°-200° C. until substantially all of said styrene, ethyl acrylate and maleic anhydride is polymerized, and (2) converting the maleic anhydride in the resulting polymer to said half ester by esterification with said alcohol.

Oil—Soluble Resins

U. S. Patent 2,965,612. Stephen Donald Holland, Urmston, Manchester, and Edward Teggin Borrowes, Bowdon, England, assignors to Shell Oil Co., a Corp. of Dela.

A process for the preparation of an oil-soluble resin from hydrocarbon fractions boiling between 150° C. and 190° C. which contain unsaturated aromatic compounds in an amount in excess of 40% by weight and which are capable of polymerizing to a solid resin, comprising the steps of adding from about 5 to about 30 parts by volume of alpha-methyl styrene per 100 parts of hydrocarbon fraction, polymerizing the mixture in the presence of a catalyst selected from the class consisting of aluminum trichloride, stannic chloride, boron trifluoride, activated clays and acids, and separating the solid fraction having molecular weights ranging between approximately 900 and 1200, as determined by intrinsic viscosity measurements, from the polymerized mixture.

Vinyl Chloride Resins

Plasticized with Amides

U. S. Patent 2,965,591. Joachim Dazzi, Dayton Ohio, assignor to Monsanto Chemical Co., St. Louis, Mo., a Corp. of Dela.

A resinous composition comprising a vinyl chloride polymer containing at least 70% by weight of vinyl chloride plasticized with an N,N,N',N'-tetraalkyl diamide of a dimer of an acid selected from the class consisting of polyolefinic acids and hydroxylated olefinic fatty acids of from 10 to 24 carbon atoms, said tetraalkyl diamide having from 1 to 8 carbon atoms in the alkyl radical.

Drying Oils Cured With Diisocyanates

U. S. Patent 2,968,647. Donald F. Koennecke and Anthony H. Gleason, Westfield, N. J., assignors to Esso Research and Engineering Co., a Corp. of Dela.

A method for improving the hardness and chemical resistance of a liquid polymeric drying oil selected from the group consisting of homopolymers of butadiene-1,3 and copolymers of butadiene-1,3 with up to 40% styrene having viscosities at 25° C. between 400 and 10,000 poises at 100% concentration, which comprises mixing 100 parts by weight of the polymeric drying oil with 0.5 to 6.0 parts by weight of an organic diisocyanate, and curing the mixture at a temperature between room temperature and 160°C.

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With no bearings or stuffing boxes in the product zone, stationary can, completely enclosed mix, and remotely controlled raising and lowering device, the Mixers are as safe in operation as they are efficient. Mixers have low original and maintenance cost, are easy to clean, and extremely versatile in operation.

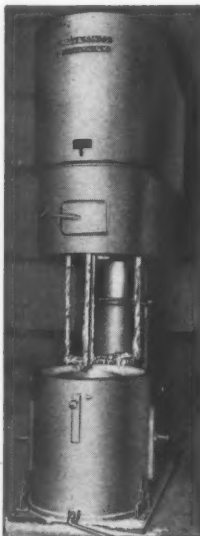
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Illustration shows an 85 gallon #130CDM Double Planetary Change Can Mixer furnished a leading concern for mixing plastisols of several types ranging up to 200,000 centipoises. Customer reports Mixer in operation 24 hours/day with mixing time per batch only 15-20 minutes; while the quality of mix and dispersion is so high that the final product is obtained in the Mixer alone—without further processing through a Three Roll Mill as was previously necessary with other Mixers.



Jacketed cans for heating or cooling material during mixing, dolly trucks, gates on cans for discharge, and vacuum tight covers can be provided.

*—...or any other heavy paste material. On paints, inks, pharmaceutical products, caulking compounds, and other similar materials, the Ross Double Planetary Change Can Mixers mix and disperse up to 30 times faster than other Mixers.

Mixers available in 1, 2, 3, 4, 6, 8, 12, 20, 25, 65, 85, 125 and 150 gallon sizes. Write for complete information on these or other types of Ross mixing, grinding or dispersing equipment!



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148 CLASSON AVE., BROOKLYN 5, N. Y.

Synthetic Drying Oils

U. S. Patent 2,967,838. Alexander M. Partansky, Concord, Calif., assignor to The Dow Chemical Co., Midland, Mich., a Corp. of Mich.

An esterification product of (1) the oxyalkylated reaction product of (a) a phenol-formaldehyde novolak in which there are 4 to 10 phenolic hydroxyls per molecule, substantially all of the phenolic constituents of the condensate being the trifunctional phenol, C_6H_3OH , with (b) from 0.85 to 1.2 mols for each phenolic nucleus of at least one compound from the group consisting of ethylene oxide and propylene oxide, said oxyalkylated product being one which is insoluble in aromatic hydrocarbons, and (2) carboxylic acids in amount to provide from 0.35 to 0.9 carboxyl group per alcoholic hydroxyl of the said oxyalkylated product, at least 60 percent of the carboxyl groups being furnished by fatty acids having drying characteristics.

Stabilizers for Polymeric Compositions

U. S. Patent 2,968,642. William M. Le Suer, Cleveland, Ohio, assignor to The Lubrizol Corp., Wickliffe, Ohio, a Corp. of Ohio.

A thermally stable composition containing a vinyl chloride polymer and a minor proportion of a product prepared by the process which comprises preparing a mixture of

- (a) an alkylated monohydroxy aromatic compound,
- (b) an oil-soluble, metal-free, non-tautomeric organic polar compound having at least 12 aliphatic carbon atoms and selected from the class consisting of sulfoxides, alcohols, esters and amines, present in an amount greater than that of (a) on a weight basis, and
- (c) at least two equivalents of a basic barium compound per equivalent of (a)

and heating said mixture to drive off substantially all free water which may be present and then treating said water-free mixture with an acidic gas having an ionization constant greater than that of (a) until the titratable basicity of the mixture has been substantially reduced.

Rain Repellent Composition

U. S. Patent 2,967,163. Jacob M. Fain and Abraham Goldman, Brooklyn, N. Y., assignors, by mesne assignments, to the United States of America as represented by the Secretary of the Navy.

An optically transparent water-repellant composition which dries hard in about four hours consisting of about 7.5 to about 25.0 parts by weight of a phthalic anhydride-glycerol alkyd modified with styrenated castor oil acids, about 0.1 to about 0.3 part by weight of paraffin wax, about 2.0 to about 5.0 parts by weight of a film hardener and

about 90.4 to about 69.7 parts by weight of a solvent wherein the ratio of paraffin to solid resin content is between 1 to 83 and 1 to 150, the film hardener is from 15-25 percent of the solids content, and the ratio of alkyd to styrene is between 91 to 9 and 41 to 59.

Drying Oils from Sucrose and Raffinose

U. S. Patent 2,970,142. Henry B. Hass, Summit, N. J., assignor to Sugar Research Foundation, Inc., New York, N. Y., a Corp. of N. Y.

The process of producing a drying oil which comprises treating a saccharide selected from the class consisting of sucrose and raffinose with an ester of a drying oil fatty acid and a volatile lower alcohol, employing at least about 6 moles of said ester for each mole of said saccharide, in the presence of an alkaline

catalyst at a temperature of between about 20° C. and 120° C., until said saccharide contains at least 4 of said acid groups per molecule of saccharide.

Composition for Removing Coatings

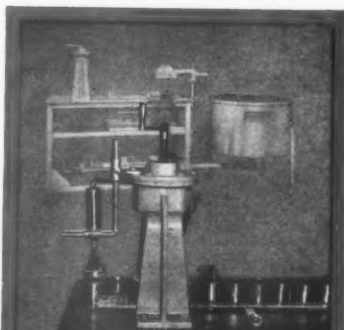
U. S. Patent 2,969,328. Evelyn Ellenson and Richard Galba, both of 57 W. 57th St., New York, N. Y.

A liquid composition for removing a coating from a coated surface consisting of methylene chlorobromide and at least one liquid halogenated hydrocarbon having from one to three carbon atoms and at least one halogen atom selected from the group consisting of chlorine and bromine, with the methylene chlorobromide having a ratio of from 5 to 95 parts by volume to 95 to 5 parts by volume of the liquid halogenated hydrocarbon, and sufficient morpholine to give the mixture a pH of 6 to 8.

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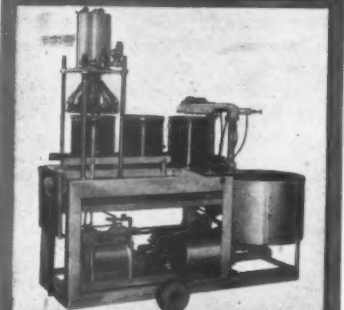
FILLING and SEALING MACHINES



MODEL PF-C

FILLS, SEALS, COUNTS, CODES

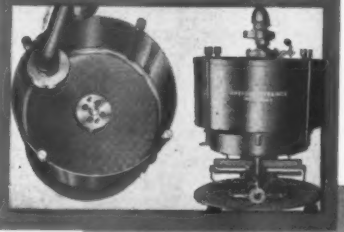
With this air-operated, portable machine, ONE OPERATOR seals, fills, counts and codes HALF-PINTS 30 to 35 a minute. PINTS or QUARTS 25 to 30 per minute. ½-GALLONS, 18 to 20; GALLONS, 16 to 18. No materials wasted. Accurate No-Drip Nozzle delivers a clean package. Used by major Paint manufacturers. (U.S.A. and Foreign).



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COMBINATION FILLER and SEALER of LUG or RING-TYPE PAILS

This duplex air-operated unit fills and seals PER MINUTE 6 to 8 FIVE-GALLON PAILS - 8 to 12 TWO-GALLON PAILS - 14 to 16 ONE-GALLON (depending on viscosity of product). It stops the waste of old-fashioned handling of heavy containers with SAFE, CLEAN, ACCURATE production methods. Needs only one man and 60 lbs. plant air. Endorsed by leading Paint Manufacturers.



MODEL PSM-2

SELF-CLEANING, HIGH-PRODUCTION STRAINER

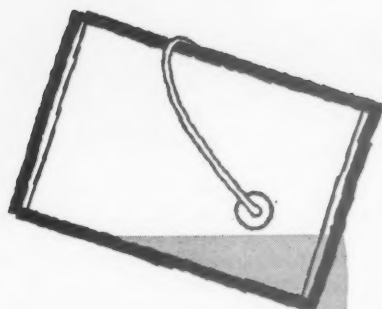
Constructed of non-corrosive metals throughout, this portable Self-Cleaning Strainer has INTERCHANGEABLE SCREENS 10 to 250 mesh. Built for lasting heavy-duty production, it cleans high viscosity fluids 30 GALLONS A MINUTE. Gearless, safety air-powered. An evolution in paint-straining equipment for all Paint, Varnish and Lacquer Manufacturers or Processors of industrial, chemical, or food oils and fluids.

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THE MEARL CORPORATION

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Paint Reclaiming

U. S. Patent 2,968,638. Joseph G. Meckler, 4030 Colony Rd., South Euclid, Ohio.

A method of reclaiming a resin-containing paint substantially insoluble in a normally used paint vehicle comprising the steps of interreacting a fatty acid component having a 13 to 17 carbon chain attached to the carboxyl group, a polyhydric alcohol having from 2 to 6 carbon atoms, and an acid anhydride selected from the class consisting of maleic anhydride, succinic anhydride, and phthalic anhydride to a liquid polymeric state compatible with the resin-containing point; admixing the liquid polymer with such paint; and then adding such normally used paint vehicle to the admixture, such liquid polymer serving as a bridging agent between such resin-containing paint and such paint vehicle to render such paint and vehicle mutually compatible.

**Improved Dispersion of Pigments
In Enamels**

U. S. Patent 2,967,841. Albert R. Hanke, Westfield, N. J., assignor to E. I. duPont de Nemours and Co., Wilmington, Del., a Corp. of Dela.

In a process for preparing an enamel coating composition by milling an oil-modified resin vehicle and a pigment, selected from the group consisting of phthalocyanine and dioxazine pigments said pigment being one which is agglomerated in said vehicle to the extent that it is the predominating cause of color variation in the enamel composition upon using different methods of applying said composition, the improvement which comprises passing the milled material through a homogenizer.

Polyester Resins

U. S. Patent 2,967,840. Benjamin Phillips and Paul S. Starcher, Charleston, W. Va., assignors to Union Carbide Corp., a Corp. of N. Y.

An oxirane oxygen-containing polyester of 4-cyclohexene-1,2-dicarboxylic acid, propylene glycol and oleic acid wherein an oxirane oxygen is attached to the 4,5-ring positions of the cyclohexane-1,2-dicarbonyl groups of said polyester.

Highlighting the May issue will be comprehensive coverage of the aerosol field; developments in solvents will be the theme of the June issue; formulations, manufacture and testing and evaluation of traffic paints will be covered in September. All issues will include features and departments of interest such as New Equipment and Materials, Patents, News and other columns devoted to foreign developments, production and aerosol coatings.

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proprietary ethyl alcohol
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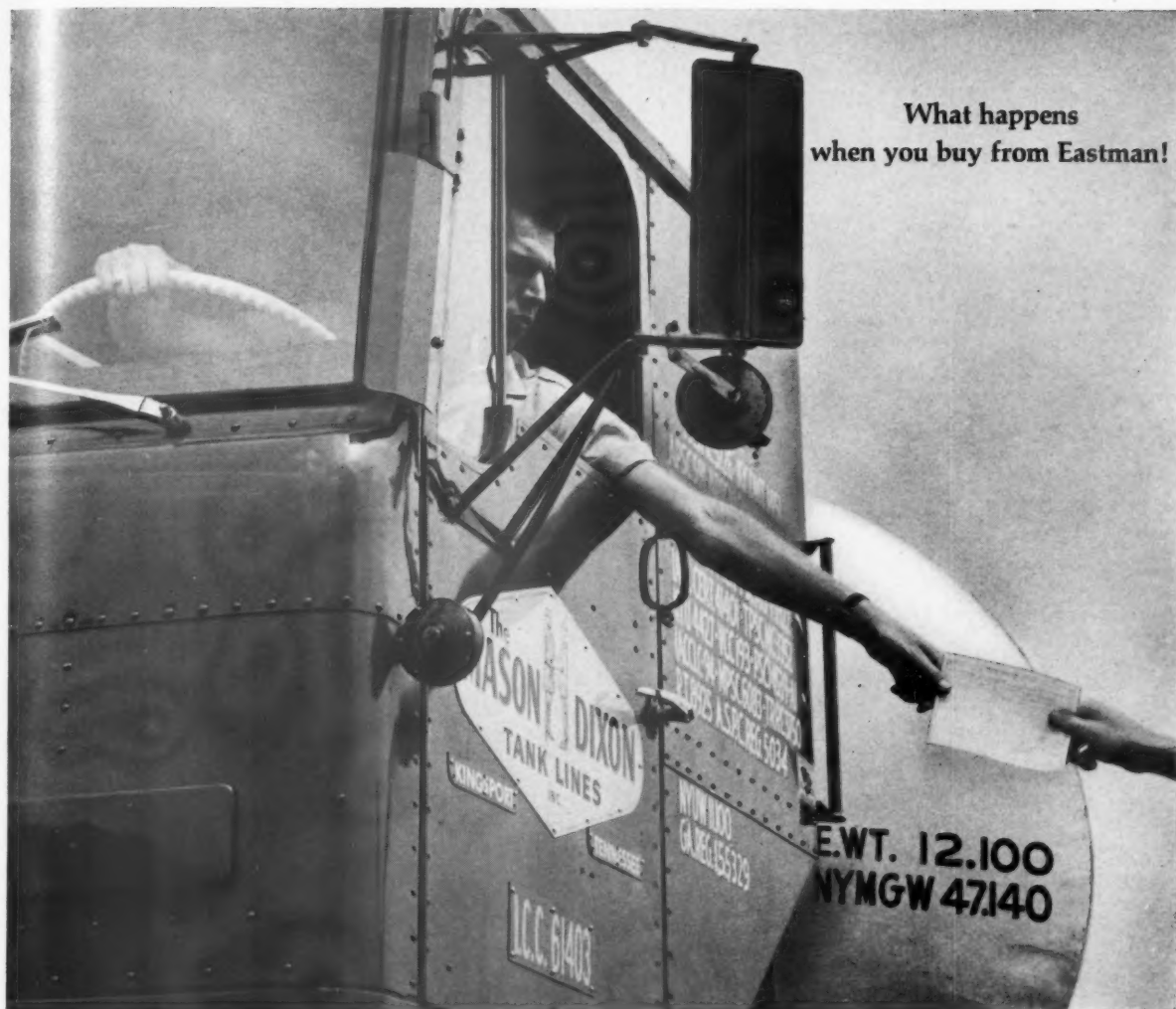
n-Butyl Acetate

Isobutyl Acetate

For properties and shipping information on these and other Eastman products, see **Chemical Materials Catalog**, page 363, or **Chemical Week Buyers' Guide**, page 107.

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"Every now and then we are able to make special service seem real easy," recalls one of our sales coordinators.

"Like the time we filled an order for a tank truck of acetone on Saturday afternoon—and it arrived at the customer's plant before dark.

"I was busy at home (the third inning was just over) when the customer traced me through our plant switchboard operator. He had unexpectedly run out of acetone and

was faced with the prospect of shutting down unless he could obtain at least enough to tide him over the weekend.

"I guess it took all of three minutes to complete two phone calls, including one back to the customer to tell him that we could make the shipment, and for him to have a crew stand by about 6:30 P.M. to unload a tank truck.

"Of course, we had a number of things working for us on this one.

First, the customer's plant was only four hours away by truck. Second, he was able to catch me at home; and third, the customer had a tank truck order for acetone scheduled for Monday delivery, and this tank truck just happened to be loaded, approved, and at the terminal ready to go."

We were lucky in this instance, but do all we can every time, to assure our customers the best service possible.

Eastman CHEMICAL PRODUCTS, INC., KINGSPORT, TENNESSEE, Subsidiary of Eastman Kodak Company

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Detroit; Greensboro, North Carolina; Houston; Kansas City, Missouri; New York City; Philadelphia; St. Louis.
West Coast: Wilson & Geo. Meyer & Company, San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

How to earn dividends without risking a cent!

"When we switched to MILTON cans, I thought it a wise way to use our dollars. Little did I know how richly it would pay off!"

LEE PRITZKER, *President, Lasting Products Co., Inc.*

LASTING PRODUCTS CO., INC. is a progressive paint manufacturer with a chain of fifteen busy stores in Baltimore, Md., plus dealers scattered throughout the area. Other activities include aggressive government sales and mail order divisions.

Naturally, Lasting Products' president, Lee Pritzker, is keenly interested in ways to keep inventory in hand without sacrificing service. President Pritzker found a good way to accomplish this—one that has been earning him risk-free dividends ever since. Here are the facts:

Lee Pritzker has found that by using MILTON cans, his firm's stocks are held to a practical limit—freeing for more profitable use funds normally tied up in large inventory. When can supplies get down to a predetermined minimum, his purchasing man merely phones . . . A shipment speeds the 186 miles separating the MILTON and Lasting Products Co. plants, arriving in almost no time at all!

Unlike many another paint producer, Mr. Pritzker never worries about can stock shortages; MILTON deliveries have always proven too reliably prompt for that.

Use of MILTON cans earns Lasting Products dividends in another way, too . . . MILTON service includes carting cans from carrier into the user's plant on dollies. Use of dollies simplifies receiving operations, speeds unloading time. This cuts receiving department labor costs because the job is done with fewer men. Cans still on them, the dollies are left in the plant. Later movement of cans to the production line is a mobilized cinch. Again Lasting Products enjoys a time-saving, labor-saving dividend!

MILTON makes lined, unlined, plain, lithographed, standard and made-to-order cans. Whichever you use, you, too, enjoy dividends without risking a cent when you buy from MILTON. See if a trial order doesn't convince you . . . Call EVergreen 3-1100 today.



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TECHNICAL Bulletins

CENTRIFUGAL PUMPS

New 12-page selection catalog for users of centrifugal pumps has just been published.

Included in this condensed, easy-to-use circular are charts showing the recommended temperature and pressure ranges for ten classifications of the firm's Pumps—from minus 350°F. to plus 1000°F., and up to 1000 psig. Illustrations, brief descriptions and specifications are shown for each.

Dean Bros. Pumps, Inc., Dept. PVP, 323 W. 10th St., Indianapolis 7, Ind.

TEMPERATURE CONTROLS

New catalog shows complete line of the firm's differential expansion type temperature controls. Included is a general description of their operation together with a picture and brief specifications of each model.

Both electric and pneumatic instruments are covered. Instruments are available for temperatures up to 2000°F and in choice of standard, water tight, or explosion proof enclosures.

Burling Instrument Co., Dept. PVP, Chatham, N. J.

PERFUMES

New perfume catalog is a comprehensive publication devoted to a wide variety of perfume oils and perfumers' materials.

Important flowerols and perfume specialties as well as their aerosol bouquets are listed.

A section of the catalog is of special interest to manufacturers of industrial products. This section contains a large list of cover-odors, which are widely used to make unpleasant scents in such materials as paints, adhesives, bonded fibres, inks, insecticides, fertilizers, rubber, waxes, solvents and varnishes. The manufacturers of such products are more than ever interested in covering unpleasant odors to make their wares more saleable.

Florasynth Laboratories, Inc., Dept. PVP, 900 Van Nest Ave., New York 62, N. Y.

GERMAN BUYERS' GUIDE

Third edition of the *Buyers' Guide to Imported German Products* has just been published for the German American Chamber of Commerce, New York, N. Y. This comprehensive reference book is a complete up-to-date revision of the 1958/1959 edition.

With over 50 per cent of its contents changed, the *Buyers' Guide* reflects the development of the annual \$2 billion German-American trade volume. The constant expansion of the market for new products is evident in the increased number of pages contained in the 436-page book.

The *Buyers' Guide* is said to be the only reference book on German-American trade. It contains a directory of 2500 German export manufacturers, their 1500 U. S. importers or agents and a classified index listing over 2000 German products sold in the United States.

The section, "Facts on Germany," has been revised in order to provide American business with the latest information on Germany as a market and as a supplier. The contents include facts and figures on German business, taxation, government regulations, market research, conversion tables, statistics, travel, etc. The book also features a 14 x



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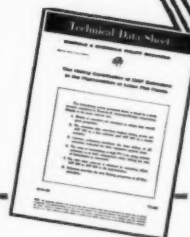
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FILLING MACHINES

Newly revised eight-page, 8½ by 11-in. three color, fold-out brochure describing the complete line of filling machines for all types of liquids, creams, pastes, paints, chemicals and food products is now available.

Among the filling machines described and illustrated in the brochure are single-purpose tube fillers, closers and crimpers; automatic combination fillers, closers, crimpers and ejectors that operate at speeds from 25 to 150 fills per

minute; combination liquid and paste fillers; single and twin volumetric liquid fillers; and bench and floor-type multiple liquid fillers that operate at speeds up to 40 cycles per minute in 4, 6, 8 and 12-nozzle designs.

Filling machines that are described and illustrated include several models of automatic straight-line and twin straight-line conveyORIZED heavy-duty volumetric filling machines that fill at speeds of up to 30 cycles per minute per nozzle; a 16-station rotary filler that operates at speeds from 110 to 320 containers per minute; and a special three-line heavy-duty paint, enamel and stain can filler. Single semi-automatic and automatic straight-line volumetric fillers

for pilot run and small plant production; straight-line can coders and custom timing screws are also shown in the brochure.

Arthur Colton Co., Dept. PVP, 3400 East Lafayette, Detroit 7, Mich.

NACREOUS PIGMENTS

New revised edition of a new eight-page nacreous pigment handbook has been published. New material covering murano colors, synthetic pearl essence in color, and a non-lead pearl pigment is included in the new edition.

As in the original version, introductory material describing natural and synthetic pearl pigments is followed by concise discussions of the important factors such as dispersion and orientation of pearl crystals, choice of pigment types, formulations for various applications, and application procedures. Also included in the latest edition is a table showing the formulation designations of the various synthetics divided into the three main categories: (1) for surface application; (2) for casting in polymerizable resins; (3) for incorporation into plastics.

The Mearl Corp., Dept. PVP, 41 E. 42nd St., New York 17, N. Y.

INSULATING VARNISHES

Technical bulletin on the formulation and use of insulating varnishes based on diallyl phthalate resins is now available.

The eight-page bulletin covers findings recently announced by the firm which indicate a successful technique for utilizing the properties of diallyl phthalate in coating, sealing, dip encapsulation, and laminating applications. The resins are already well established as molding materials for electronic parts because of their unusual insulating, electrical, and dimensional stability properties.

Formula, application, and processing data—supported by several photographs and tables—are given for the varnishes, which are applied by dipping the selected part in a resin solvent solution, drying to remove solvent, and baking to cure. Cured resin properties of finished coatings are also described in detail.

Dapon Dept., Food Machinery and Chemical Corp., Dept. PVP, 161 E. 42nd St., New York 17, N. Y.

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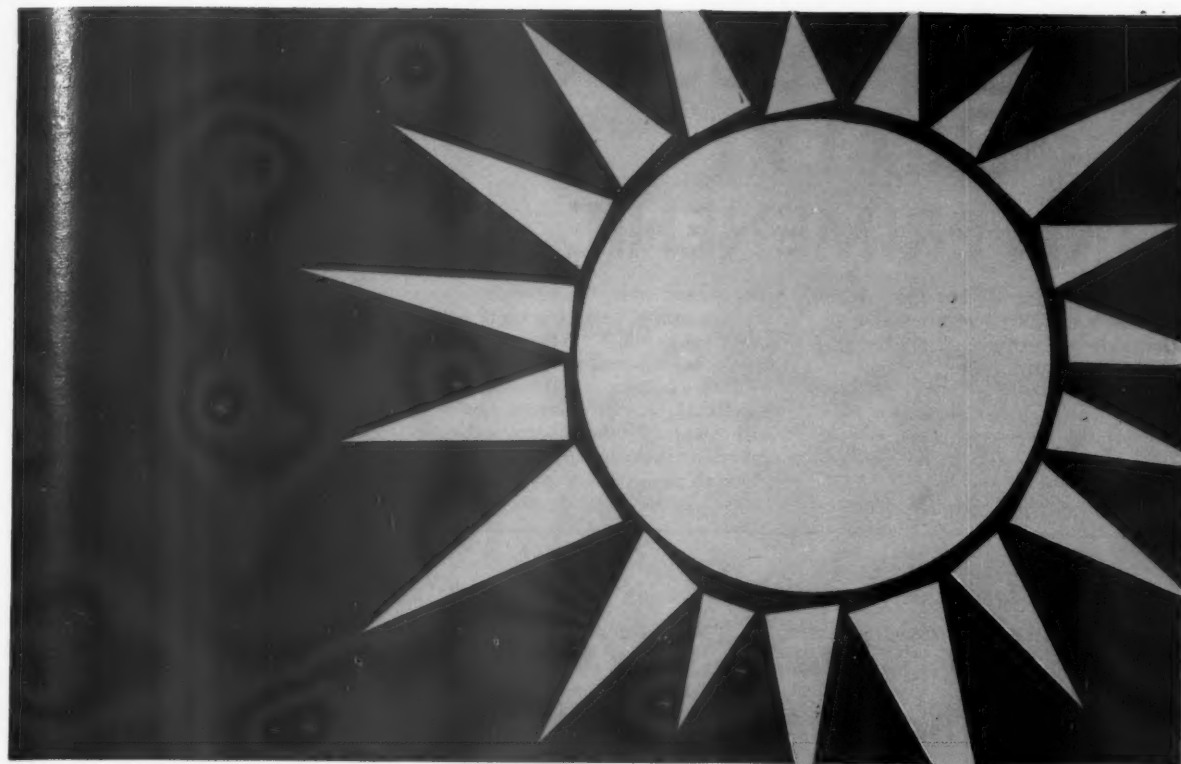
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2-NP is to the newer coatings what butyl acetate has been to nitrocellulose — an ideal solvent. 2-NP's evaporation rate permits maximum flow and leveling without delaying drying time.

Unlike ketones, 2-NP in vinyls eliminates problems of solvent residue and solvent odor, too. It has several safety features such as relatively high flash point and a high lower-flammability limit of vapors in air. Write for all the literature that details how CSC's 2-Nitropropane can brighten your day.

Evaporation Rate of 2-NP Compared to Other Solvents (volume)

Acetone	975
MEK	568
Toluol	197
MIBK	186
2-NP	110
n-Butyl Acetate	100
Xylol	69
Cellosolve	38
Isophorone	4.3

Flash Points (*F Tag Open Cup) of 2-NP Compared to Other Solvents

Acetone	16
MEK	30
Toluol	56
MIBK	81
Xylol	85
n-Butyl Acetate	92
2-NP	103
Cellosolve	126
Isophorone	202

Comparison of Lower Limit of Flammability of 2-NP With Other Solvents (% by volume in air)

MIBK	0.9
Xylol	1.0
Toluol	1.27
n-Butyl Acetate	1.7
MEK	1.8
Acetone	2.15
2-Nitropropane	2.6
Cellosolve	2.6



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LAKOKRASOCHNYE MATERIALY I IKH PRIMENENIE

New Polysiloxane Lacquer from Products of Cohydrolysis of Ethylthendichlorosilane and Phenyltrichlorosilane.

D. Ya. Zhidkin, A. P. Nagaeva, and B. N. Tardov. Lakokrasochnye Materialy i Ikh Primenenie, 1960, 4:17-20.

The article describes the synthesis and properties of the lacquer EF-17. In the cohydrolysis, ethylphenyldichlo-

rosilane and phenyltrichlorosilane were taken in ration 1 : 0.5 (ration of phenyl and ethyl groups 1 : 0.5); toluene was taken as solvent (50% of lacquer weight). In their initial state, films of the EF-17 lacquer compare favorably with those of other thermostable organosilicon lacquers as regards electro-physical properties, thermal stability, and dielectric loss during aging at

200-250°C. The EF-17 lacquer film, which also possesses hardness and elasticity superior to those of Soviet-made EF-3 and EF-5 lacquer films, is recommended for insulation of electrical apparatus and supplies. The paper tabulates comparatively the properties of other similar Soviet-made lacquers of the EF and K groups.

A New Anticorrosion Coating Stable To The Action of Chemicals and Water.

B. L. Agranat, I. A. Zholondz', N. I. Kofman. Lakokrasochnye Materialy i Ikh Primenenie, 1960, No. 3, 49-51.

A new technique of anti-corrosive protection of apparatus and equipment in the chemical industry consists of gluing a chemically stable fiber to the surface, followed by lacquering. On surfaces not exposed to high temperatures, one coat of fiber equals some ten lacquer coats; the fiber suggested by authors is Soviet-made "Chlorin" (a PVC fiber). The entire technique consists of these steps: surface cleaning; primer coating, drying; lacquering, followed by covering with one layer of fiber, drying; coating the fiber with chemically stable lacquer, drying; final coat of chemically stable enamel or lacquer; final drying. The method, tested in industrial conditions (HCl manufacture, hydroelectrical equipment, machine industry), is recommended for the industry in general.

The Transformations of Styrene-Butadiene Latexes in Paint and Lacquer Coatings.

I. S. Okhrimenko V. M. Kobetskaya O. N. Ustinova, and T. A. Bereznykh Lakokrasochnye Materialy i Ikh Primenenie, 1960, 4:26-30.

The transition of the styrene-butadiene copolymer into its insoluble three-dimensional structure takes place partially already in the latex globules during their formation. The film transition during the drying and extended atmospheric exposure of latex films is basically a result of the oxidation processes. The data obtained by authors indicate that the structurization process prevails over the destruction processes. The atmospheric oxidation of latex films affects primarily the double bonds of the main chain of the styrene-butadiene copolymer; the side-chain double bonds remain practically without effect. The occurring internal structurization in the copolymer causes changes in physico-mechanical properties of latex films (resistance to rupture, elongation, swelling, etc). Latexes with 100% monomer conversion are more stable; they are recommended in practice for preparation of water-emulsion paints. Latexes with 60 or 80% monomer conversion become rapidly inferior.

Independent Laboratory* confirms "...Tung Oil, in exterior Latex Paints, produces superior adhesion on chalky painted wood and masonry surfaces".

NOW YOU CAN SOLVE ADHESION PROBLEMS IN EXTERIOR LATEX PAINTS WITH RAW TUNG OIL!

You can insure superior adhesion on difficult chalky painted wood and masonry surfaces, when you add raw TUNG OIL to Exterior Latex Paints. And the same Research Report, issued by a leading Independent Laboratory*, confirms the superiority of raw TUNG OIL in obtaining adhesion without sacrificing other important performance qualities.

*DAVID LITTER LABORATORIES—New York, N. Y.



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And it *belongs* in flat paints—where effective coverage is an indispensable quality. To achieve it, experienced paint formulators rely on a happy combination of the right vehicle and the right TITANOX white pigments.

For organic solvent flats, TITANOX-RCHT (30% TiO_2) and TITANOX C-50 (50% TiO_2)—both carrying their own extender—give highest hiding at lowest cost. For emulsion flats, easy dispersing,

high-hiding TITANOX-RA-50 rutile “pure” titanium dioxide is preferred.

Like all TITANOX pigments, these products have the uniformity of all properties and easy working qualities that help keep paint production men out of difficulty. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments, Ltd., Montreal.

TITANIUM PIGMENT CORPORATION
SUBSIDIARY OF NATIONAL LEAD COMPANY



Photometric Determination of the Brightening Capacity (Intensity) of White Pigments.

B. L. Rubinshtein, S. V. Yakubovich, G. S. Bogdanova, Z. A. Bazilevich. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 51-55.

A new, objective method of determining the brightening capacity of white pigments consists in measuring the intensity coefficient of a dry mixture of white pigment and ultramarine, and determining the brightening capacity by calibrating against a standard curve for a white pigment. The method differs from other known methods in employing a dry mixture of pigment powders (it dispenses with the binder). Lithopone (a mixture of zinc sulfide and barium sulfate) was employed as the standard pigment, but any white pigment may be used for this purpose. Any type of ultramarine may be used as the contrasting pigment; the standard and the sample mixtures should, however, contain one and the same type of ultramarine. All instruments designed for measuring intensity coefficients are suitable for this method. The value of the method lies in the possibility to employ the brightness measurements directly in calculating specific surfaces, particle sizes, and particle quantities of pigment mixtures.

Regeneration of Phthalic Anhydride Wastes in Alkyd Resin Production.

Minkovich, O. A. *Lakokrasochnye Materialy i Ikh Primenenie*, 1 (1960), 83.

A method of regenerating phthalic anhydride wastes, designed to prevent the 8% loss of this substance in the production of alkyd resins in the USSR, is based on its conversion into phthalic acid, and the recrystallization of the latter from aq. solution. The method requires complete separation of phthalic acid from additives; the phthalic acid yield is 90% of the anhydride wastes.

Study of the Effect of Pigments on Structure Formation in Concentrated Solutions of Alkyd Resins. P. I. Zubov and N. F. Proshlyakova. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, 4:13-17.

By studying thermomechanical curves and deformation, the authors investigated the effect of pigment addition to 50% solutions of alkyd resin FK-50 on the structural-mechanical properties of the latter. FK-50 resin was prepared by condensation of 50% castor oil, 18% glycerine, and 32% phthalic anhydride. The following typical pigments were studied: Berlin blue, petroleum black, zinc oxide, and titanium dioxide in rutile form. The following results were obtained: 1) concentrated

solutions of the FK-50 resin have no ability to form thixotropic structures; they behave as viscous fluid systems; 2) The formation of three-dimensional structure and the acquisition of thixotropic properties occur in the presence of thixotropic additives; 3) Petroleum black imparts the highest, TiO_2 the lowest thixotropic characteristics to concentrated solutions of the FK-50 resin. (of the pigments studied).

Copolymerization of Tung Oil and Styrene.

G. L. Yukhnovskii, B. M. Rudenko. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 32-35.

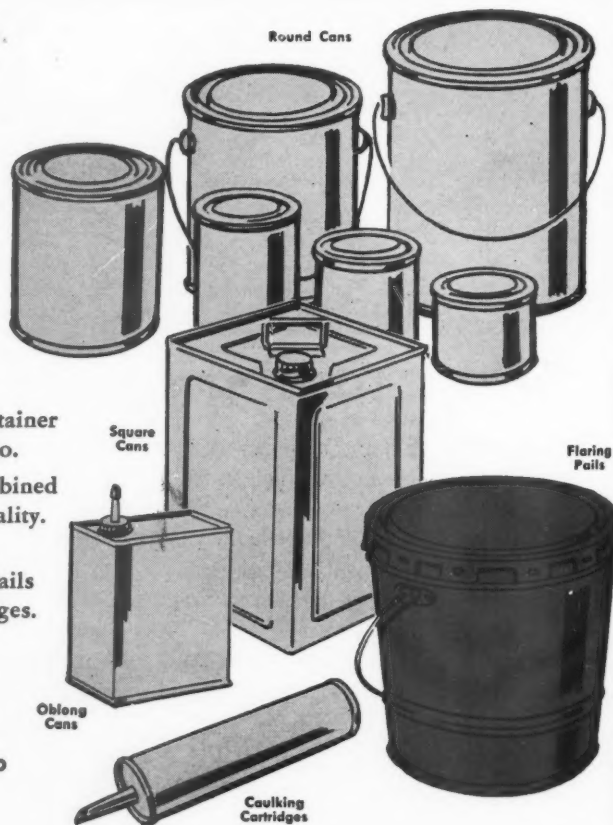
Copolymerization of oxidized tung oil with styrene lends the reaction products a higher viscosity than when non-oxidized tung oil is employed; the rate of styrene bonding is also increased. The reaction proceeds much slower in the presence of petroleum and aromatic solvents, where even a low amount of bound styrene leads to gelatinization. Turpentine allows the reaction to proceed much more satisfactorily; apparently acting as a link-transferring agent, it lowers the gelatinization tendency thus permitting the formation of low-molecular products. The presence of some peroxides (terpene peroxides, isopropyl benzene hydroperoxide) in the reaction sphere leads, at

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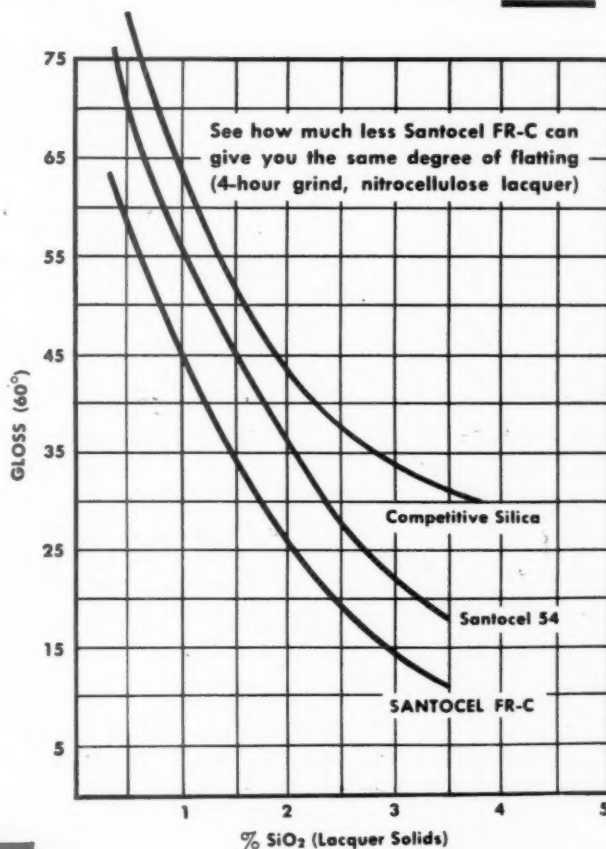
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elevated temperatures, to an increased reaction rate; higher temperatures also cause the formation of homogeneous products. The authors determined the optimum reaction conditions for the described copolymerization of tung oil and styrene: 85-90% tung oil and 10-15% styrene yields a copolymer stable in storage which forms a transparent film with good technical properties. When using oxidized tung oil, the amount of styrene should be increased to 15-20% of tung oil quantity; at the same time, higher quantities of solvent (35-45%) are necessary. The effect of varying degree of oxidation of tung oil upon the styrene bonding and the viscosity of reaction products are tabulated at temperature of 140°C (using turpentine as solvent).

Domestic- and Foreign-Made Weatherometers and the Norms for Them.

G. O. Tatevos'yan. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 65-70.

The paper compares various types of light and water exposure apparatus for artificial weathering tests currently manufactured in the US and the Soviet Union. The characteristics of each weatherometer are tabulated. Soviet-made weatherometers are of two types: IP-1-2 whose technical characteristics are similar to those of the US-made (by Atlas) HV-DL apparatus, and AIPST-2-4-2. The author also discusses the relevant standards (i.e., ASTM E42-55T). 33 literature references.

Investigation of Mechanical and Working Properties of Paints and Lacquers During Aging.

S. V. Yakubovich, Yu. L. Rivlina, N. L. Maslennikova. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 19-22.

A study of the change in coating elasticity during natural and artificial aging of two types of resins: nitrocellulose coatings, and those based on alkyd and alkyd-melamine resins. Of the five methods of artificial aging employed by authors, the weatherometer is said to be the most suitable and reliable. The experiments indicate that in both artificial and atmospheric aging, coating elasticity falls off considerably faster than its resistance to cracking. The sharpest decrease in coating elasticity occurs in the initial period of aging, and slows down thereafter. High initial elasticity of a coating does not indicate a superior resistance to aging, since in working conditions the coating has much lower elasticity than the initially high elasticity value; the indicative and more important value is the residual elasticity in the aging process. It is therefore imperative to determine optimum values of residual elasticity, at which coatings retain their cracking resistance for the longest time under working conditions. Current and standard methods of elasticity measurement do not permit the determination of small coating deformations. In contrast to several recent non-Russian papers on the relationship of elasticity decrease to protective properties of coatings, this report is concerned with the relationship between elasticity and length of service.

Protection of Transformer Coils with Epoxy Enamels EP-91 and EP-74T.

L. F. Nikiforova. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 44-46.

Description of the technology of application and drying of the two enamels and of lacquer EP-074 for electroinsulating. Both enamels are said to have good mechanical and electroinsulating characteristics, they dry well, and retain their protective properties for over one year. In coat thickness of 300-400 μ , the films are resistant to thermal shock and stable at prolonged aging at 150-180°C.

Increasing the Mechanical Resistance of Organosilicon Enamels.

K. A. Andrianov, O. I. Gribanova, and V. S. Tikhonov. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, 4:10-13.

An investigation of attempted improvement of the mechanical stability of organosilicic polymers by increasing the number of phenyl radicals in the polyorganosiloxane. Studies have shown

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that films based on polyphenylsiloxanes, in which oxygen atoms and phenylene radicals alternate between silicon atoms, possess increased mechanical strength and lower thermoelasticity. The effect of several inorganic fillers was also investigated. Addition of 10% asbestos into the lacquer increases the initial abrasion resistance of enamels. While chrome oxide in small amounts does not add to the strength of the lacquer film, it favorably affects the dispersion of asbestos in the lacquer.

Socialist Pledge of the Institute for Paint and Lacquer Materials.

Lakokrasochnye Materialy i Ikh Primenenie, 1960, No. 3, 1.

The research and technical staff of GIPI-4, the Soviet Union's chief governmental research and planning institute for paints and lacquers, have pledged themselves to carry out the following tasks during the year of 1960: 1) Development of fast-drying enamels based on alkyd-styrene and phenol-formaldehyde resins for protective finishing of agricultural machinery; 2) Study of the composition of a new illmenite concentrate with increased contents of chlorine; 3) Purification of waste waters in the paint industry from phenol, formaldehyde and methanol; 4) Development of a technical regime of iron oxide grinding, and study of the

effects of pigment moisture, size, air pressure etc. upon the grist quality; 5) Study of the film-forming properties of polyester acrylates with the aim of synthesizing new types of furniture finishes; 6) Perfection of methods of purifying epoxide resins, and construction of necessary equipment; 7) Improvement in synthesis of main types of alkyd resins (primarily penta-phthalic) as regards shorter technological process, lower losses, etc.; 8) Study of synthetic car-finishing enamels and alkyd bases modified by synthetic fatty acids; testing these in practice; 9) Exceed the 1960 Plan quota by ten percent.

Coating of Metallic and Wooden Details with Hot Lacquers and Enamels.

L. B. Shishmareva, P. A. Dipershtein. Lakokrasochnye Materialy i Ikh Primenenie, 1960, No. 3, 41-44.

An outline of current Soviet techniques and recommendations for hot application of lacquers and enamels. The "UGO-2" apparatus for hot coating is described in detail and on a schematic drawing. Manufactured by the Khotkov Experimental Plant for Painting Equipment, the "UGO-2" is the most current and widely used hot-paint applicator in the Soviet furniture, radio and automobile industries.

The New Chromate Primer AGL-14.

I. I. Denker and V. I. Antropova. Lakokrasochnye Materialy i Ikh Primenenie, 1960, 4:30-35.

The AGL-14 primer consists of a mixture of tung, linseed and other oils, with a mixture of phenolic resins; zinc whites and talc are added; 25% of Zn chromate is suggested to be the appropriate amount (the article does not give precise composition). As regards fast drying, adhesion, water swelling and thermostability, the AGL-14 primer is said to surpass by far other similar Soviet-made primers. Thermostable at temperatures of 200-225°C., it is suitable for priming aluminum alloys, various steels, in systems with various fast-drying enamels (such as perchlorovinyl, nitrocellulose, polyacrylate etc.) and with oil and glyphthalic ones. For example, the perchlorovinyl system with AGL-14 possesses high water stability, and better properties than any analogous systems.

Use of Epoxide Fillers in the Machine Industry.

E. A. Klyachko. Lakokrasochnye Materialy i Ikh Primenenie, 1960, No. 3, 39-40.

Description of the uses and conditions of application of several types of Soviet-made epoxy fillers.

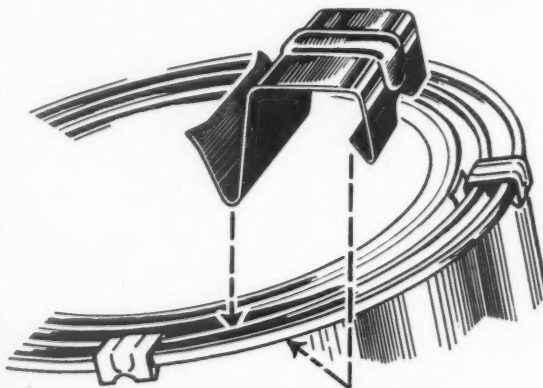
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Anti-Corrosive Coatings for Protection of Metals in the Tropics.

V. V. Zhebrovskii, F. I. Rubinshlein. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 25-31.

An investigation of the stability of several types of organic coatings in conditions of elevated temperature and humidity, and of the effectiveness of a number of fungicidal substances. It is confirmed that epoxy resins are suitable bases for preparation of stable coatings for the tropics; two new compositions (primer EP-09T and enamel EP-74T) were prepared. Coatings containing phenol-formaldehyde resin were found to have very high stabilities to relative humidity; a new phenol-formaldehyde enamel (FL-76) was prepared. Equally stable coatings may be prepared from polymerizing resins (perchlorovinyl, and copolymer of vinyl and vinylidene chlorides); new types of enamel were thus prepared (PKhV-715 of various colors, and black enamel KhS-77). When applied on epoxy primers, enamels based on copolymer of butyl methacrylate form a suitable coating protection in tropical humidities. Phenyl mercuro-oleate and pentachlorophenol were found to have the highest fungicidal effectiveness in most of the coating materials studied. These fungicidal agents may be added to compositions of coatings whose drying temperatures do not exceed 100°C. Special fungicidal wax pastes FP-1 and FP-2 (not described in detail) were prepared for protection of coatings from mold growth.

Benzo-Stable Lacquers and Paints.

Ya. L. Raskin, S. A. Uranov, T. L. Tatarinova. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 13-19.

A report on the synthesis of a number of coatings inert to the action of gasoline and its mixtures with benzene and other petroleum products. 1) Coating prepared from urea-formaldehyde resins combined with alkyds possess, apart from stability to benzene, high physico-mechanical properties and technical characteristics. Despite their insufficient stability to the action of hot water and saturated vapors, two types of these products (primer UBG-1 and enamel UBE-1) are used for coating gasoline canisters. 2) A benzo-stable coating was prepared on the basis of oil-modified phenol formaldehyde resin combined with glyphthalic resin and tung oil; it consists of a primer and an enamel, and in addition to having high physico-mechanical properties it is stable to the action of hot water, saturated steam, and alcohol. The coating is being successfully used for finishing car gasoline tanks. 3) Benzo-stable enamels, prepared on basis of butadiene acrylonitrile rubber and cresol-formaldehyde resin, has good im-

pact resistance, elasticity, and stability to gasoline mixtures. 4) The enamel T60, based on polyvinyl butyral and cresol-formaldehyde resin, is suitable for the protection of large storage tanks for petroleum chemicals.—The paper describes the syntheses of individual products, and the conditions and results of their extensive testing.

Chemically-Active Coatings from Phenol-Formaldehyde Resins.

M. D. Gordonov, I. N. Levit. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 47-48.

Assuming that methylol groups are capable of reacting with zinc chromate to form complexes, the authors studied the preparation of stable, naturally drying protective coatings based on resol phenol-formaldehyde resins. Bakelite

lacquer and Zn chromate were tested and found suitable for the preparation of coatings stable to oil and benzo-compounds, to steam and water at temperatures up to 200°C.

A New Technological Method of Preparing Alkyd Resins.

K. M. Gol'dberg. *Lakokrasochnye Materialy i Ikh Primenenie*, 1960, No. 3, 76-77.

The proposed new flowsheet for production of alkyds decreases losses of glycerine and phthalic anhydride. Re-esterified oil is transferred from reactor I (esterification reactor) to storage tanks; after cooling to 150-180°C. it is drawn off to reactor II (containing phthalic anhydride). The reaction in reactor II proceeds smoothly at 150°C., without any formation of water.

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Southern Paint Society To Hold Meeting, March 15th

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The Southern Society for Paint Technology will hold its annual convention on March 15th through the 18th at the Atlanta Biltmore Hotel, Atlanta, Ga. The membership, composed of paint technologists from most of the southeastern states, will convene for the purpose of electing officers and conducting club business, attending a full program of technical presentations.

The program of the convention follows, with a list of raw material and equipment exhibitors:

Wednesday, March 15, 1961

Afternoon:

- 1:00 P.M. - Raw Material and
- 5:00 P.M. - Machinery Exhibits

Thursday, March 16, 1961

Morning:

- 8:30 A.M. - Registration Desk and Raw Materials and Machinery Exhibits Open
- 10:00 A.M. - Invocation by Dr. Monroe F. Swilley, Pastor, Second-Ponce de Leon Baptist Church, Atlanta, Georgia.

Atlanta Convention officially opened by President C. P. Schlesinger.

Introduction of Federation Officers and Representatives.

Introduction of National Paint, Varnish, and Lacquer Association Representative.

- 10:30 A.M. - "Recent Developments of Epoxy Resins in High Build Maintenance Coatings"

By: G. G. Velten
Plastics and Resins Dept. Shell Chemical Co.

- 11:30 A.M. - "Emulsion Paints on Wood" by W. G. Vannoy
Given by: W. H. Madson
Pigment Department, E. I. Du-

Pont de Nemours and Company

Afternoon:

- 2:00 P.M. - Address by General Joseph F. Battley, President, National Paint, Varnish and Lacquer Assn.

- 2:30 P.M. - "The Use of Petroleum Resin in Place of Resin"
By: Dr. P. O. Powers
Pennsylvania Industrial Chemical Corporation

- 3:30 P.M. - "Exterior Latex Paints for Wood Substrates"
By: Mr. Sidney Werthan
The New Jersey Zinc Company and The American Zinc Institute

- 4:00 P.M. - Meeting Adjourned

Friday, March 17, 1961

Morning:

- 8:00 A.M. - Breakfast Meeting of the Nominating Committee, R. B. McGoogan, Chairman—Room 1009 Biltmore Hotel.

- 8:30 A.M. - Machinery and
- 5:00 P.M. - Raw Materials Exhibits

- 9:45 A.M. - Business Meeting, Southern Society for Paint Technology Report of Council Representative, William A. Smith

Committee Reports

Election of Officers for 1961-62

- 11:00 A.M. - "Sand Grinding Process for Dispersing Pigment"

By: Mr. Bill Colie
Fabrics and Finishes Dept.
E. I. DuPont de Nemours & Co.

- 11:30 A.M. - "Paint Additives—

Afternoon:

- 2:30 P.M. - Panel on "The Influence of Vehicles on Interior Wall Paints," John J. Hughes, Jr., Mod.

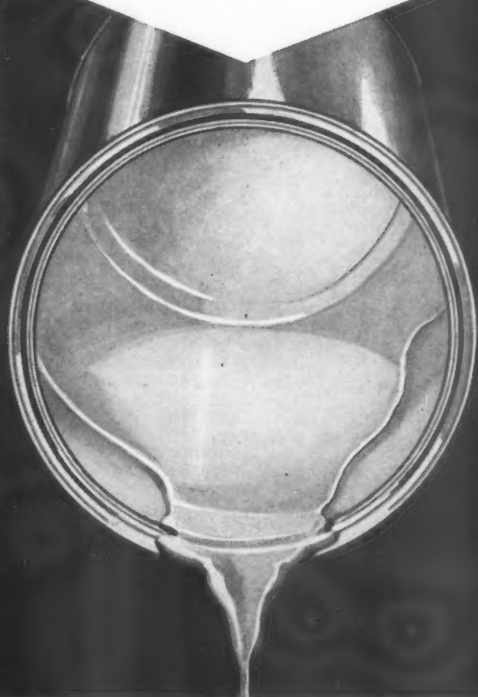
Saturday, March 19, 1961

- 8:30 A.M. - Breakfast Meeting of the Advisory Committee and Federation Officers, Room 1007—Biltmore Hotel

LIST OF EXHIBITORS

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24	Advance Solvents & Chemicals Company
9, 10	Archer-Daniels-Midland Company
4, 5	Buckman Laboratories, Inc.
25	Charles L. Burks & Company
21	Colton Chemical Company
11	Commercial Solvents Corporation
48, 49	The Dow Chemical Co.
6	Gardner Laboratories
13, 14	General Aniline & Film Corporation
26	The Glidden Company
22, 23	The Goodyear Tire & Rubber Company
40	Herman Hockmeyer & Company
30	R. T. Hopkins Company
45	Kinetics Dispersion Corp.
35, 36	Metals Disintegrating Company
51	George E. Missbach & Company
12	Mineral Pigments Corp.
42, 43	Morehouse-Cowles Corp.
1	Nuodex Products Company
38, 39	A. J. Passonno Company
50	Raybo Chemical Company
2, 3	Charles Ross & Sons Co.
31, 32	F. H. Ross & Company
16	Smith Can Company, Inc.
27	Spencer Kellogg & Sons, Inc.
41	Troy Chemical Company
7, 8	Union Carbide Chemical Company
17, 18, 19	Vulcan Steel Container Company

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New Developments

Diallyl Phthalate Varnishes Boost Resin's Versatility

Increased versatility of Dapon diallyl phthalate resins as insulating materials for electrical and electronic equipment is indicated with the announcement by Food Machinery and Chemical Corp., New York City, that varnishes based on these resins have been developed.

The development, in effect, makes the unusual insulating and electrical properties of diallyl phthalate—already widely used as a molding material for electronic parts—available for coating, sealing and dip encapsulation.

Cured Dapon resin coatings are found to offer excellent resistance to moisture, chemicals, corrosive gases, fungus, weathering, and aging over a wide temperature range. They show particular promise for protective coatings on capacitors, re-

sistors, transformers, form-wound coils, motor windings, transistors, diodes, and similar parts.

Coatings are customarily applied by dipping the particular part in the resin solvent solution, drying, and baking for cure. Coating thicknesses can be adjusted during the dipping operation by altering the solvent ratio. Pre-drying of coatings in a one-to-three mil thickness range for about ten minutes at 90°F. removes the solvent to a level where consistent coatings can be obtained after cure. After drying, the coatings exhibit very low run-off or dripping characteristics which offer advantages over use of materials that remain liquid or tend to droop during cure.

Good cures can be obtained, with the use of peroxide catalysts, at 320°F. for 15 minutes. Coatings on heat-sensitive parts can be cured at temperatures as low as 212°F. when the time is extended to 16 hours.

Prepolymers of both diallyl phthalate, available as Dapon 35, and diallyl isophthalate, marketed as Dapon M, have been successfully incorporated in the resin varnishes.



The diallyl phthalate resin varnish applied to this carbon resistor produces a hard, chemical-resistant coating after curing at 320°F. for 15 minutes. Such coatings possess very high electrical properties and can withstand the heats required for soldering.

The latter offers unusually high heat-resistant properties. FMC markets only the basic resins; varnishes can easily be prepared using materials available in the average coating shop.

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ZINC DUST PAINTS

(From page 30)

Treating of the linseed oil with these materials 24 hours prior to paint formulation has produced optimum results.

The amine is added in amounts slightly less than is theoretically required to neutralize the free fatty acid. Thus, for an oil of acid number 3.7 for which the theoretical amount of amine is 0.23% by weight of the oil, 0.2% has been found satisfactory. Tetraethyl orthosilicate in amounts of 5% by weight on the oil is recommended.

Gas formation in the alkyd and phenolic resin zinc dust-zinc oxide paints can also be reduced by treating the resin solutions with these same additives 24 to 48 hours before compounding.

Although gas formation has not been completely prevented, the rate of gassing has been reduced sufficiently so that zinc dust paint may be considered as a trade sales item.

Zinc dust-zinc oxide linseed oil paints have been used successfully as a primer on weathered, millscale and sand blasted steel as well as on galvanized and copper surfaces. The good performance characteristics of zinc dust paint are not changed by adding these volatile gas inhibitors.

Bibliography

- (1) Hinz, K. Zinc Dust Compounds Seifen-Öle-Fette-Wachse 54, #18, 549-553 (September 3, 1958)
- (2) Grady, Lester D. U. S. Patent 2,044,292 Zinc Dust Paint, June 16, 1936
- (3) Baruch, A. P. Unpublished Data, ASARCO Central Research Laboratories

ALKYDS — RECENT TRENDS

(From page 37)

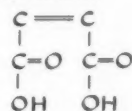
cal Company is also a producer of this material as is American Cyanamid. Heyden Newport Chemical Corporation and Pittsburgh Coke and Chemical round out the group of major suppliers. Standard Oil of California is a projected supplier.

As compared to the estimated fifteen million pound consumption by the alkyd industry in 1959, the polyester industry utilized 22 million pounds of maleic anhydride in 1959.

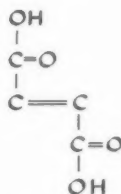
The fastest growing use for maleic anhydride appears to be in the area of polyester resins. Even so, it is estimated that by 1961 there will be only a 79 million pound market for this product whereas, if all the projected expansions take place, there will be a 200 million pound per year capacity.

Fumaric Acid

Closely related to maleic anhydride is its stereoisomer, fumaric acid. The difference between the two materials, chemically, may be observed from the two following formulas:



Maleic Acid

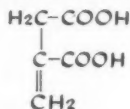


Fumaric Acid

It may be observed that the two carboxyl groups in maleic anhydride are close together which accounts for the ease of anhydride formation. In fumaric acid, on the other hand, they are separated and thus fumaric acid does not exist as an anhydride. Thus, there is at least a formal analogy between these two compounds and isophthalic acid and phthalic anhydride. It has been estimated that two million pounds of fumaric acid were utilized for alkyd resin production in 1959 as compared to a ten million pound per year total production.

The literature provides little indication about why fumaric acid should be used in alkyds in preference to maleic anhydride, and the cost of the material has provided little incentive for extensive research. Undoubtedly, however, alkyd chemists will be finding out more about fumaric acid as its availability increases.

Among the dibasic acids proposed for use in alkyd resins is itaconic acid which has the following structure:



Itaconic Acid

It is said to offer an advantage over other unsaturated dibasic acids, such as maleic and fumaric, by providing finished compositions with lower viscosities while still containing higher quantities of the unsaturated dibasic acid. This has been discussed by Hines and Bilello [*Official Digest*, 313, 125 (1951)].

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pH Meter of remarkable ac-
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Gentlemen:

As long as I can remember, salesmen (now delicately referred to as sales engineers) have told me, "If you can manufacture 'it' better and less expensive than anyone else, we can sell 'it' faster than you can make 'it'."

For years we looked for 'it.' We found 'it,' we tested 'it' and now we are making 'it' — better and less expensive than anyone else.

'It' is Dianol Anti-Mildew Compound.

'It' was tested in the field and laboratory for three years.

'It' is in production now.

'It' is more effective and longer lasting than the mercurials.

'It' is non-toxic.

'It' is less expensive than the mercurials.

For further information, prices, samples, please write.

Sincerely,

Robert D. Spiers

ROBERT D. SPIERS
General Manager



Self-spray paint troubles stop here

This is part of Sprayon's quality-control laboratory, where six full-time chemists and paint technicians make sure that your aerosol finishes—custom-loaded by Sprayon—never vary in color or performance. Before production begins, even on a routine re-order, prototype cans are made up in the laboratory and given an accelerated aging test equal to a year of shelf life. Test panels are then sprayed and the film is analyzed by precision instruments. Gloss and other characteristics are checked. Color is double-checked under a MacBeth light, the accepted standard of the paint industry. The spray pattern and the mechanical efficiency of the container are checked. All test data, materials and samples are dated, coded and filed for a year for later reference. Sprayon quality control is one reason why Sprayon has handled the greatest possible variety of contract-loading assignments for many of the nation's largest manufacturers—year after year after year. Get the full Sprayon story today.

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AEROSOL COATINGS

PACKAGING

FORMULATION

PRODUCTION

Elias Shapiro, executive vice-president of Plasti-Kote of Cleveland explains plans for extensive national advertising campaign of the company's line of fast dry aerosol paints, which feature a newly-designed "Accu-Spray" head. The campaign will include LIFE Magazine, the Good Housekeeping Seal of Approval, the United States Testing Company Seal. The approach to direct consumer exposure in the TV series will start off with 20 one-minute spot announcements in Tampa, Fla. and Columbus, Ohio. The TV promotion will be coordinated with full-page newspaper ads. Initial budget of \$250,000 is planned.



KIEFER

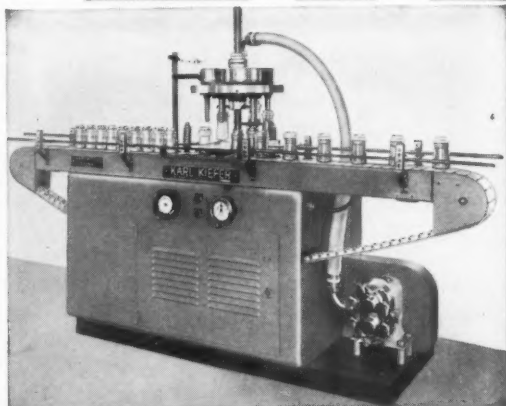
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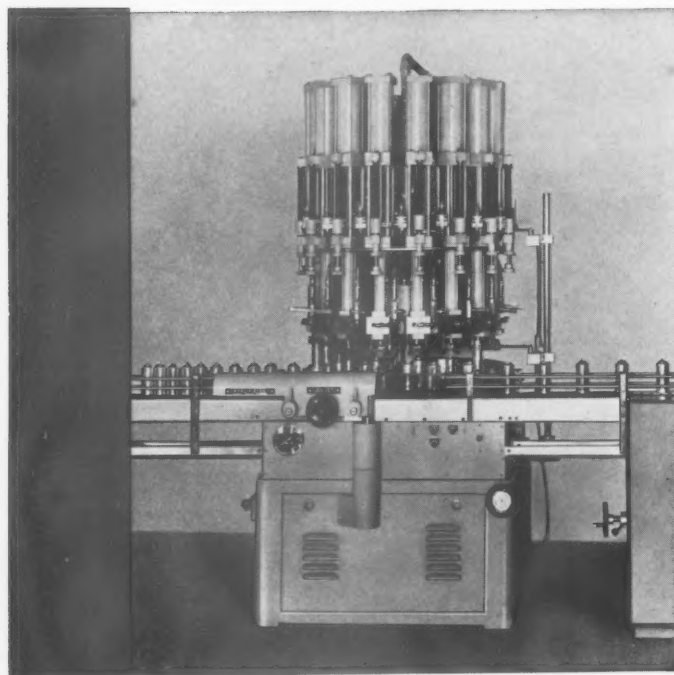
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equipment the market affords.



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- III. For the perfect delivery of liquid or viscous
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- IV. Operator manually feeds up to 36 aerosol
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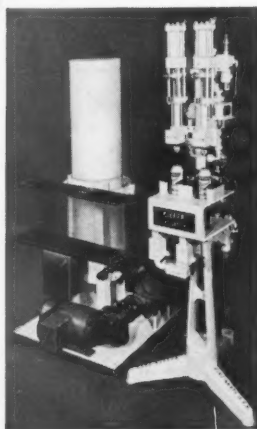
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III. MONO-PISTON
PAINT FILLER



IV. 2-STEM GAS-JET
AEROSOL
CHARGER

HOW TO SET UP AN AEROSOL LABORATORY

Part II

By
Dr. John J. Sciarra*

PART I of this article covered the basic equipment required by an aerosol laboratory in order to adequately fill aerosol products utilizing either hydrocarbons or fluorinated hydrocarbons as the propellant. Aerosol paints and related products have been successfully formulated using these gases. A good surface coating spray can be obtained through use of such propellants. However, it may be possible to utilize some of the compressed gases as propellants for certain of these products. Compressed gases can be handled very easily in the laboratory without the use of elaborate equipment. The gases are generally available in heavy steel cylinders containing from about 8 ounces to 16 pounds for nitrogen and 8 ounces to 60 pounds for nitrous oxide and carbon dioxide. Since the compressed gases are under high pressure, a pressure reducing valve is required. The gauge closest to the cylinder measures the cylinder pressure and will indicate when the gas in the cylinder is almost exhausted, while the other gauge can be set to the desired delivery pressure. Attached to the delivery gauge is a flexible hose capable of withstanding about 150 pounds per square inch gauge pressure and fitted with a filling



Fig. 8. Filling of aerosols with compressed gases.

head. More elaborate units utilize a flow indicator between the gauge and the flexible hose. To use this equipment for filling aerosols with compressed gases, the concentrate is placed into the container, the valve crimped in place and the air evacuated by means of a vacuum pump (in some cases evacuation of the air may not be necessary). Then the filling head of the compressed gas filler is inserted into the valve opening, the valve depressed, and the gas allowed to flow into the container. When the pressure within the container is equal to the delivery pressure, the gas stops flowing. Figure 8 shows a typical

set up for filling compressed gas aerosols. For those products requiring an increased amount of gas, or where solubility of the gas in the product is necessary, carbon dioxide and nitrous oxide can be used. In order to obtain maximum solubility of the gas in the product, the container is shaken manually during and after the filling operation. Mechanical shakers are also available for this purpose.

Other Equipment

There are several other pieces of equipment which will enable one to fully carry out an aerosol research program. When one packages a product in a metallic container visibility of the product is not possible but may be desirable. For this purpose, glass aerosol compatibility tubes, Figure 9, have been designed. This will enable one to view the contents under pressure and determine miscibility, settling rates, suspension characteristics, and changes in physical appearance upon standing (including discoloration). The opening of the tube is provided with threaded fittings and will use a standard 1" cup metal container valve and can be handled without any other special equipment a wire mesh screen is provided as a safety measure. These tubes are available in sizes from 30ml to 12 fl. oz.

A series of pressure gauges, Figure 10, are used to check the total pressure within the container. While the pressure in most instances, can be calculated beforehand, the final pressure should always be measured with a gauge which has been calibrated against a standard test gauge. This will then correct the gauge and give a more accurate



Fig. 9. Aerosol compatibility tubes.

*Associate Professor of Pharmaceutical Chemistry, St. John's University, College of Pharmacy, Jamaica 32, New York.

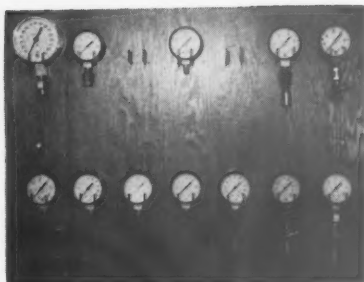


Fig. 10. Pressure testing gauges.



Fig. 11. Can puncturing device.



Fig. 12. Slip-on pressure tester.



Fig. 13. Screw-on-top for aerosol containers.

reading. These hand gauges are of two types, the prepressurizing and the non-prepressurizing type. For those cases where the product is not corrosive and will not damage or stain the gauge the nonprepressurizing type gauge can be safely used. In this type the product will fill the gauge and come into intimate contact with the working parts of the gauge and may prove harmful. This can be partially overcome by inverting the container, clearing out the dip tube by exhausting some of the vaporized propellant and then measuring the pressure while the container is in the inverted position. In this way, only the vaporized propellant can come in contact with the gauge and will not be of harm to any of the delicate parts of the gauge. The prepressurizing type is used for those products which may contaminate the gauge (especially paint products) or where a more accurate pressure reading is desired (as with compressed gas aerosols). This gauge is prepressurized to within 5 pounds per square inch of the expected reading with air or nitrogen. Then the gauge is placed over the valve of the product to be measured. When the valve is depressed the pressure can be measured. In the case of compressed gas aerosols, the expansion of the gas in the valve proper will give an erroneous reading. For this reason the gauge is prepressurized in order to decrease the amount of gas from the aerosol product required to fill the gauge.

There are many other smaller pieces of equipment such as can puncturing devices, (Figure 11) "slip-on" pressure tester, (Figure 12), screw on tops for glass bottles and can (Figure 13) and aerosol can disposal units. These units can be added to the laboratory as the need for each develops.

In addition to the aerosol equipment a supply of general laboratory supplies such as beakers, graduates, test tubes, burners, etc. is required.

Testing Equipment

All aerosol research laboratories should be equipped with some testing equipment which in most cases is not of a specialized nature. Such items as pH meters, viscometer, titrimeters, colorimeters, refracto-



Fig. 14. Aerosol containers testing equipment.



Fig. 15. Water bath.



Fig. 16. Test oven.



Fig. 17. Use of safety shield.

meters, etc., can be useful in determining the characteristics of the product. The equipment available in this area is too numerous to cover at this time and is not within the scope of this article. However the type of equipment necessary is dependent upon the extent and scope of the aerosol laboratory. An aerosol laboratory used for control purposes would require an additional amount of testing equipment. A separate section of the aerosol research laboratory should be set aside for performing some of the specialized tests necessary in formulating and evaluating a new product. Figure 14 shows a view of the testing section of the aerosol research laboratory at St. John's University. The test water bath (Figure 15) and the test oven (Figure 16) along with the gas chromatography unit and the infrared recording spectrophotometer are not kept in this area due to the excessive amount of room necessary to accommodate them. The infrared recording spectrophotometer is kept in a humidity controlled, air conditioned room. The testing of aerosol products has been covered in an article appearing in this publication, October, November, 1960, and included many of the specialized tests for aerosol products.

Cost of Laboratory

Most of the specialized aerosol equipment necessary for the operation of an aerosol research can be obtained at modest cost. This section will indicate the cost of such equipment as determined from latest price lists from the various manufacturers. No attempt will be made to include the cost of the laboratory fixtures or laboratory itself since this would be extremely difficult to determine and of course would be dependant upon the size and design of the laboratory. These costs can be obtained from any laboratory supply house installing such equipment.

Table I gives a list of the various types of equipment available and the average prices are given. Further detail can be obtained by consulting the individual manufacturers listed in the bibliography. As one can see, the establishment of an aerosol research laboratory does not require the appropriation of a

large sum of money. Once the basic equipment has been obtained, the laboratory can be expanded in the future. In addition to the raw materials needed for the product concentrates, a supply of the various propellants, valves, containers, and cover caps is necessary facilities for carrying out an active research program leading to the development of new products as well as the improvement of existing products.

Safety Equipment

As with most laboratories one must always be on guard to prevent accidents. Since aerosol products are under pressure they should be handled with care. Handling of liquified gases requires special techniques and the laboratory personnel should be adequately trained in this area before being allowed to fill aerosol products. Training in this area can usually be obtained by contacting the various propellant manufacturers and suppliers of aerosol components who may be able to arrange for some training in this area. Due to the need for training and instruction in the area of aerosol technology, including aerosol laboratory, St. John's University has included two such courses in their program and are currently being offered. Other

universities may offer such courses in the future.

The main precautions to be taken when handling liquefied gases is to protect the eyes by wearing safety glasses and use of a face mask whenever necessary. Figure 17 shows the proper use of a face mask. Other procedures may also require the use of a safety shield as also shown in Figure 17. A step-ladder should also be provided especially if the propellant tanks are located above the table tops. In using fluorinated hydrocarbons and compressed gases as propellants, adequate ventilation should be provided to prevent replacement of the oxygen in the air with these gases. Use of the hydrocarbon type propellants require special handling due to their flammability. When handled properly they can be safely used in the laboratory.

Finally, it should be pointed out that an aerosol laboratory is only as good as its personnel. They should be thoroughly trained not only in aerosol technology but as to the fundamentals of the product concentrate. A knowledge of all aspects of the aerosol product will result in a greater number of successful aerosol products and a minimum of lost time.

TABLE I

A-Necessary Equipment		Cost
1. Pressure Filler, Burette Type		\$375-855
2. Cold Filling Unit		84
*3. a) Air Crimper (for cans)		300
b) Vacuum Crimper (for cans)		425
c) Hand Crimper (for cans)		160-540
d) Hand Vial Capper (for bottles)		725
e) Combination Can and Bottle Capper		368
4. Constant Temperature Water Bath		175-535
5. Test Oven		240-575
6. Compressed Gas Filling Unit		60-75
7. Miscellaneous glassware, fittings, etc.		50
8. Pressure Gauge		15
9. Standard Test Gauge		38
	about	\$1,405-2,595
*Either 3a, 3b, or 3c is required.		
B-Optional Equipment		Cost
1. Aerosol Compatibility Tube 3 oz.		\$ 5
2. Aerosol Can Disposal Unit		29-57
3. Aerosol Valve Discharge Rate Apparatus		245
4. Can Piercing Apparatus		6
5. Can Piercing Apparatus for Pressure Determination, with gauge		78
6. Set of screw-on-tops for cans and bottles		27
7. Slip-on-Pressure Tester		18

Aerosol Developments

Union Carbide Names New Fluorocarbon Team

Union Carbide Chemicals Co., Division, of Union Carbide Corp., New York, has named a new fluorocarbons marketing team responsible for sales of "Ucon" fluorocarbons to

the aerosol, air conditioning, and paint industries.

Operating under the direction of John R. Hulten, newly appointed manager—specialty chemicals marketing, the group consists of E. E. Husted, manager—fluorocarbons

marketing; Thomas M. Hartley, sales manager—"Ucon" Propellants; and Charles F. Gray, sales manager—"Ucon" refrigerants. In addition to his duties as head of fluorocarbons marketing, Mr. Hulten is now responsible for marketing of agricultural chemicals.

Formerly manager—fluorocarbons marketing, Mr. Hulten joined Carbide's fellowship at Mellon Institute of Industrial Research in 1941. Following World War II he joined the sales department of Union Carbide Chemicals Company as technical representative. He later became Albany (N.Y.) district manager; and Central division manager and was appointed to his most recent post in 1957. A native of Washburn, Wis., he received a Bachelor of Science Degree in chemical engineering from the University of Wisconsin in 1941.

Mr. Husted had been sales manager of "Ucon" propellants to the aerosol industry since 1958. He joined Union Carbide Chemicals Company in 1945 and spent five years as a Technical Representative selling synthetic organic chemicals to the plastics, paint and lacquer, textile specialties, and petroleum industries.

Born in Denver, Colo., Mr. Husted received a Bachelor of Science Degree in chemical engineering from Princeton University in 1942. He served three years as a group armament officer in the U. S. Air Force, attaining the rank of Captain.

Mr. Hartley for the past three years has served as sales manager—"Ucon" refrigerants. From 1952 to 1958, he was associated with Linde Co., Division of Union Carbide Corp., where he served as a sales representative in New Jersey, St. Louis and Chicago; and as assistant sales manager of the Gas Apparatus Department. He served two years in the Air Corps and is a 1950 graduate of the Wharton School of Finance and Commerce of the University of Pennsylvania.

Mr. Gray was formerly a technical representative in the "Ucon" propellant marketing group, working out of the company's Chicago office. He joined Union Carbide Chemicals Co. in 1952 and served as technical representative for chemical sales and service in the Western Michigan territory; New



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York, N. Y.; at the Mellon Institute, Pittsburgh; and in Philadelphia. He was named to his most recent post in 1958. He graduated in 1952 from Purdue University with a Bachelor of Science Degree in chemical engineering; and served two years in the U. S. Marine Corps.

New Rack Introduced For Spray Paint Line

New display rack, manufactured by Illinois Bronze Powder Co., Chicago, Ill., can be a counter, floor, island or end-of-aisle display. The new piggy back rack is offered



New piggy back display rack.

to dealers at no extra charge. . . two racks free with the purchase of a 36 can assortment of the new metallic spray and top coat.

This entirely new line of metallic paints, developed in the firm's laboratories, is available in nine beautiful colors: Golden Lustre, Coppertone, Brass, Platinum Silver, Antique Gold, Pewertone, Government Bronze, Statuary Bronze and English Antique Bronze.

All are manufactured of the highest quality pure imported and domestic powders. Customers can now apply a "professional" metallic finish at home, according to the aerosol firm. Simple-to-use spray covers evenly, dries quickly. Applied to wood, glass, metal, china or plaster, the new metallics practically eliminate any rub-off or tarnish so typical of many metallic finishes.

Mexican Company to Produce Fluorinated Hydrocarbons

A new Mexican company, Halocarburos, S.A., is being formed by Industrias Quimicas de Mexico, S.A. of Mexico City to produce "Freon" fluorinated hydrocarbons for aerosol propellants.

This will be the first Mexican production of fluorinated hydrocarbons, which have been imported during the past 15 years. It will result in an annual saving of 6,000,000 pesos (\$480,000) in dollar exchange. All raw materials will be purchased in Mexico.

Sprayon Products Announces New Warehouse Facilities

Newly expanded warehouse facilities at the company's No. 4 plant on East 70th St., have been announced by Sprayon Products, Inc., Cleveland, Ohio. Now totaling some 30,000 square feet, the increased space was made necessary by growing volume, and will allow efficient storage and bulk drop shipment of customers' orders in almost any amount.

Equipped with the latest in materials-handling equipment, the new facilities will accommodate some 600,000 aerosol cans ready for shipment.

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VITAL--

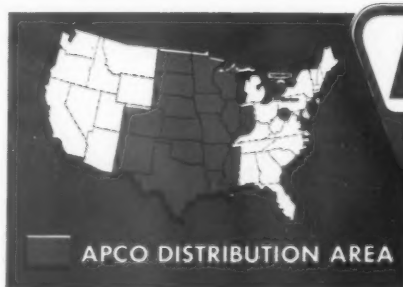


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WANTED-PLANT MANAGER

Production, filling, packaging, quality control, etc. Lab. chemical background preferably in industrial finishes field. Capable of setting up new plant. Brooklyn, N. Y. Address Box 361.

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For chemicals to paint and printing ink industries. Profit sharing. Send complete resume of sales and flying experience. Box 362.

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Superintendent, small lacquer, paint and varnish plant in mid South. Technical and mechanical control desired. Box 363.

NEWS

NEWS OF COMPANIES, ASSOCIATIONS
TECHNICAL GROUPS
ITEMS OF GENERAL INTEREST

Birren Sees Charcoal As No. 1 for Exteriors

Look for charcoal, the house paint color that rocketed to popularity in 1960, to maintain its number one position as the trend toward exterior colors continues.

That's the word from a well-known color authority's study of new consumer preferences in house colors based on sales figures of a wide variety of exterior home products.

Faber Birren, color consultant to Monsanto Chemical Co.'s Plastics Division has predicted that charcoal will be joined by beige, aqua, turquoise, off-white and blue, in that order, as the top six colors for the immediate future.

According to Mr. Birren, these colors will remain steady: gray, light green, soft yellow, coral pink and colonial maroon. They are all part of the big shift, he says, toward lighter and livelier hues that mark the "pastel era" which began about 1956, when the dark colors such as browns and dark greens fell from

favor. These colors, along with ivory, cream, buff and white, will continue to give ground, he says.

Mr. Birren findings show that the white painted house, which once accounted for 75 per cent of all house colors, today represents only 50 per cent of the total. More significantly, 75 per cent of new house exteriors now are in bright colors, whether a California contemporary a colonial salt-box in New England or a formal antebellum in the South, according to Mr. Birren.

The increased demand for house color has been stimulated by the introduction this year by several major paint manufacturers of new and durable latex paints for exterior use which offer a wider range of colors than any other type, particularly the popular soft, clean hues. Easy to use and quick-drying, they offer economic and timesaving advantages to the "do-it-yourself" and professional painters, in addition to excellent color retention.



The latest in solvents services and selling was discussed in Fort Worth recently by personnel of the R. P. Lightfoot Co. The meeting was conducted by Lightfoot management and Anderson-Prichard Oil Corp., representatives for the solvents distributing company's route salesmen. Seated from left to right: Chas. A. Cotter, Jr., APCO, Oklahoma City; Harry Holtzer, E. A. Foster, M. M. Earnheart, J. N. Mann, all of Ft. Worth; J. W. Bounds, San Antonio; C. A. Gault, APCO, Oklahoma City. Standing: T. E. Carrell, Cooper, Texas; Robert E. Hogue, Ft. Worth; F. E. Russell, Ft. Worth; D. D. Rubek, APCO, Chicago; J. R. Hathaway, Dallas; E. V. Farr, Austin; O. L. Barham, Corpus Christi; C. W. Dent, Ft. Worth; R. E. Jones, Houston; W. G. (Chub) Hume, APCO, Okla.

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NEWS

Velsicol International Forms Mexican Company

Velsicol International Corp., C. A., announced the formation of a subsidiary in Mexico. Name of the new Mexican company is Velsicol Internacional de Mexico, S.A. de C.V.

The new company will warehouse and sell paint resins, rubber resins, floor tile resins, hardboard raturants, and the important agricultural insecticides — heptachlor, endrin and chlordane.

Dixon Enters Coatings Field

Dixon Chemical and Research, Inc., major Eastern producer of sulphuric acid, has entered the field of specialty coatings, sealing compounds and chromic acid by contracting to purchase all of the capital stock of Better Finishes and Coatings Company and its subsidiaries, it was announced.

Dixon agreed to pay \$750,000 in cash and stock to purchase the Newark-based company, which includes the stock of its subsidiaries, Surface Coating Engineers, Inc., and Doremus-Passaic Realty, Inc.

Better Finishes, originally formed to manufacture the "Liquid Envelope" used in mothballing ships, now also produces a variety of industrial and maintenance coatings, such as urethanes, and epoxies.



Constituent Society Meetings

Baltimore, 2nd Friday, Marty's Park Plaza Hotel.

Chicago, 1st Monday, Furniture Mart.

C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Dick Perfidio's Wishing Well.
Dayton — Nov., Feb., April, Hotel Gibbons.
Columbus — Jan., June, Sept., Everglades.

Cleveland, 3rd Friday, Cleveland Engineering & Scientific Center.

Dallas, 1st Thursday after 2nd Tuesday, Lucas B & B.

Detroit, 4th Tuesday, Rackham Building.

Golden Gate, Monday before 3rd Wednesday, Sabella's Restaurant, San Francisco.

Houston, Monday prior to 2nd Tuesday, Rams Club.

Kansas City, 2nd Thursday, Pickwick Hotel.

Los Angeles, 2nd Wednesday, Montebello Country Club.

Louisville, 3rd Wednesday, Sheraton Hotel.

Montreal, 1st Wednesday, Queen's Hotel.

New England, 3rd Thursday, University Club, Boston.

New York, 1st Thursday, Brass Rail, 100 Park Ave.

Northwestern, 1st Friday, St. Paul Town and Country Club.

Pacific Northwest, 3rd Thursday, Washington Athletic Club, Seattle, Wash.

Philadelphia, 2nd Thursday, Philadelphia Rifle Club.

Piedmont, 3rd Wednesday, Rainbow Supper Club, High Point, N. C.

Pittsburgh, 1st Monday, Gateway Plaza, Bldg. 2.

Rocky Mountain, 2nd Monday, Republican Club, Denver, Colo.

St. Louis, 3rd Tuesday, Rugger's.

Southern, Annual Meetings Only.

Toronto, 3rd Monday, Oak Room, Union Station.

Western New York, 1st Monday, 40-8 Club, Buffalo.



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CALENDAR

March 15-18. Annual Convention of the Southern Society for Paint Technology. Atlanta Biltmore Hotel, Atlanta, Ga.

March 21-30. American Chemical Society National Meeting, St. Louis, Mo.

May 1-3. Thirty-fourth Annual Meeting of the American Oil Chemists' Society. Sheraton-Jefferson Hotel, St. Louis, Mo.

May 5-6. Southwestern Paint Convention of the Dallas and Houston Societies for Paint Technology, Houston, Tex.

May 18-20. Southwestern Paint Convention of the Dallas and Houston Societies for Paint Technology, Houston, Tex.

May 26-27. Fourteenth Annual Spring Symposium of The Pacific Northwest Paint & Varnish Production Club. Hotel Georgia, Vancouver, B. C.

June 2-3. Annual joint meeting of the Kansas City and St. Louis Societies for Paint Technology, Kansas City, Mo.

June 5-9. Plastics Exposition Sponsored by the Society of the Plastics Industry, New York Coliseum.

June 20-27. 6th Paint Short Course for High School Chemistry Teachers University of Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 30-Nov. 1. Seventy-fourth Annual Meeting of the National Paint, Varnish and Lacquer Assn. Statler-Hilton Hotel, Washington, D. C.

Nov. 2-4. Annual Convention of the Federation of Societies for Paint Technology. The Shoreham and Sheraton-Park Hotels, Washington, D. C.

November 26-28. Fourteenth Annual Convention and Trade Show of the Retail Paint & Wallpaper Distributors of America at Cobo Hall, Detroit, Mich.

December 4-6. Chemical Specialties Mfrs. Assn., 48th Annual Meeting, New York City.

NEWS

American Cyanamid Moves

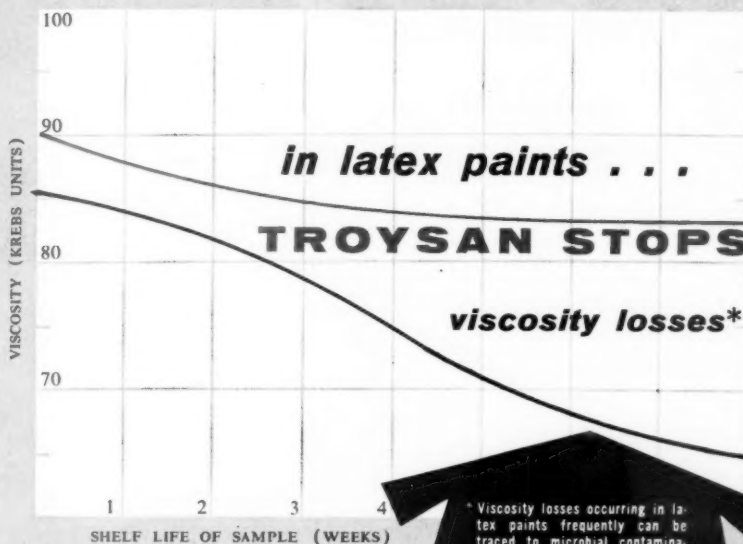
Headquarters offices of the Petrochemicals Department of American Cyanamid Co., has been relocated at Bound Brook, N. J., it was announced. The move is the first of several planned for the near future. . leading to the establishment of Division headquarters at the Bound Brook location about mid-1961.

Sherwin-Williams Readies New Research Center

Conversion of the recently-purchased building into a \$1,500,000 research center for the Sherwin-Williams Co. is now underway.

The new facility, to be known as the Sherwin-Williams Research Center, will serve both foreign and domestic plants of the company.

Initially, the new center will house research and development laboratories devoted to solvent and emulsion coatings, mineral raw materials and biological and analytical research. A number of technical service laboratories will also be located in the installation.



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by adding **TROYSAN PMA-30** to the make-up water for colloid solution — where potential for microbial activity is greatest.

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NEWS

Louis J. Woolf Dies

Louis J. Woolf, 70-year old Chairman of the Board of H. Kohnstamm & Co., Inc., died in New York City on January 12. Mr. Woolf spent 47 years with the firm. A short time after joining the organization in 1914, he was appointed sales representative in the color and flavor divisions. Thereafter, he held a number of increasingly important positions, becoming President of the company in 1950, and Chairman of the Board in 1957.

DuPont Awards \$1,400,000 For Educational Aid

Grants totaling more than \$1,400,000 have been awarded to 159 universities and colleges in the Du Pont Company's annual program of aid to education, the company announced.

The program is for fundamental research by universities, for strengthening the teaching of science and related subjects, and for facilities for education or research in science and engineering.

The largest part of the program is to help strengthen the education of scientists and engineers. Grants totaling \$654,000 were awarded for the 1961-62 academic year to more than 100 colleges and universities to support the teaching of science and mathematics as

well as other liberal arts subjects; for education and research in biochemistry in medical schools; and for postgraduate teaching assistant awards and scholarships for prospective high school teachers of science and mathematics.

Federation Group to Compile Raw Materials List

The Materials Committee of the Federation of Societies for Paint Technology is compiling a list of new raw materials for use in the coatings industry. Russell L. Sears, Chairman, announced that the committee will report on these materials to the members of the Federation and that the list will be published in July and December.

Raw material suppliers are invited to submit information on new pigments, resins, oils, plasticizers, additives, etc., to the committee. It is understood that only those materials that have distinctly new properties or composition, or that have not previously been used in the coatings industry will be considered. The committee is not interested in a new supplier of an existing pigment, or a new shade of an old pigment, or a new modification or solvent cut of an existing alkyd. The emphasis will be on materials that open up new possibilities for the coatings technologist.

Descriptive details, trade names, chemical names, and unique advantages of these products should be sent to the appropriate committeeman shown below:

(1) Oils and Chemicals—R. J. Anderson, of DeSoto Chemical Coatings, Inc., Central Research Labs., 1350 S. Kostner, Chicago 23, Ill.

(2) Additives—G. E. Arhart, of DeSoto Chemical Coatings, Inc., P. O. Box 539, Greensboro, N. C.

(3) Organic Solvent Soluble Polymers and Resins—W. P. Collo, of the du Pont Co., Marshall Lab., 3500 Grays Ferry Ave., Philadelphia 46, Pa.

(4) Pigments—C. B. Gibson, of Canadian Industries, Ltd., Foot of Loughton Ave., Toronto 9, Ont., Canada.

(5) Emulsion and Water Soluble Polymers—R. M. Hall, of James Bute Co., P. O. Box 1799, Houston 1, Tex.

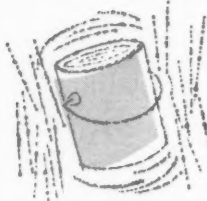
(6) Foreign Raw Materials—A. H. Moffatt, of Cruickshanks

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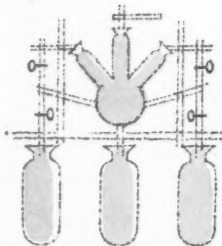
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NEWS

(Cellulose) Ltd., Black Lake, West Bromwich, Staffs., England.

(7) Plasticizers—J. J. Oates, of Subox, Inc., Foot of Lawton St., Hackensack, N. J.

(8) Solvents—E. S. Wormser, of Gibson-Homans Co., 2366 Woodhill Rd., Cleveland 6, Ohio.

The Chairman, Mr. Sears, is associated with Rinshed-Mason Co., 5935 Milford Ave., Detroit 10, Mich.

3rd Symposium Announced By North Dakota State

The Coatings Technology Department of The North Dakota State University has announced the Third Annual Symposium on New Coatings and New Coatings Raw Materials will be held June 5 to June 8 (noon), on the University campus.

This year's meeting will stress the newer developments in pigments. Other papers will concern additives, water thinned vehicles and new studies relative to coatings. The subject matter will be discussed by eighteen specialists.

The complete list of titles and speakers and housing facilities will be announced shortly.

Yenkin-Majestic Forms Ohio Polychemical Company

The formation of Ohio Polychemical Co., a division of Yenkin-Majestic Paint Corp., was announced. Ohio Polychemical will be located in Columbus, Ohio.

The new company with recently expanded production facilities and sales department, assumes from Yenkin-Majestic the manufacture and sale of alkyd and latex vehicles—previously known as Maj Resins. A 1960 output double that of last year necessitated the separation of the Vehicles Division from the Coatings Division.

Ohio Polychemical will be directed by Fred Yenkin who has been in charge of production and development for Yenkin-Majestic. The new division offers a complete line of specialty vehicles for the coatings industry.

APCO Opens Terminal

Anderson-Prichard Oil Corp., Oklahoma City, Okla., has announced the opening of a Memphis industrial solvents terminal.

The move makes available to industries of the Memphis marketing area the complete line of industrial petroleum solvents as well as chemical solvents by major manufacturers. Included are aliphatics, aromatics, alcohols, ketones, esters, glycols and chlorinated solvents. These products will be delivered in drums, tank wagons, transports and tank cars.

Hercules to Expand

Hercules Powder Co., Wilmington, Del., announced the beginning of operations of a multimillion dollar expansion program at Hercules, Calif. The expansion includes new manufacturing facilities for the production of methanol, formaldehyde, urea-formaldehyde concentrates, and slow nitrogen release urea-form for fertilizer applications.

The newly completed program provides facilities for the production of 8,000,000 gallons of methanol per year, 50 million pounds of formaldehyde, and 11,000 tons of urea-formaldehyde compositions.

These St. Joe Distributors

Akron, O.—Harwick Standard Chemical Co., 60 S. Seaboard Street
 Albertville, Ala.—Harwick Standard Chemical Co., P. O. Box 488
 Baltimore, Md.—William McGill, 237 President Street
 Boston, Mass.—Harwick Standard Chemical Co. of Mass., Inc., 601 Boylston Street
 Buffalo, N. Y.—James O. Meyers' Sons, 290 Larkin Street
 Chicago, Ill.—Fred A. Jensen & Associates, 510 N. Dearborn Street
 Cincinnati, O.—C. L. Zimmerman Co., 203 Cincinnati Union Terminal
 Dallas, Tex.—Thompson-Hayward Chemical Co., P. O. Box 6726
 Denver, Colorado—Application Engineers, Inc., 2150 S. Bellvue Street
 Detroit, Mich.—Mattenon-Van Wey, Inc., 16901 West 8 Mile Road
 Greenville, S. C.—Hamrick Standard Chemical Co., 1 Nottingham Road
 Houston, Tex.—Thompson-Hayward Chemical Co., P. O. Box 4557
 Huntington, W. Va.—Cabell Chemical Co., 101 82nd Street
 Jacksonville, Fla.—C. Whittington Co., Inc., 1641 London Avenue
 Kansas City, Mo.—Thompson-Hayward Chemical Co., 2915 Southwest Boulevard
 Little Rock, Ark.—Thompson-Hayward Chemical Co., 3100 W. 65th Street
 Long Island City, N. Y.—C. Whittington Co., Inc., 47-40 Fifth Street (for paint only)

Los Angeles, Cal.—Harwick Standard Chemical Co. of California, 7225 Paramount Boulevard, Pico River, Cal.
 Memphis, Tenn.—Thompson-Hayward Chemical Co., 1585 Harbor Ave.
 Oklahoma City, Okla.—Thompson-Hayward Chemical Co., 3000 S. Meridian Avenue
 Omaha, Neb.—Thompson-Hayward Chemical Co., 1110 S. Fourth Street
 Philadelphia, Pa.—Van Hout, Metz & Co., Inc., 201 E. Elm Street, Conshohocken, Pa.
 Pittsburgh, Pa.—R. L. Weston, c/o St. Joseph Lead Co., Monaca, Pa.
 Portland 14, Ore.—Cordano Chemical Co., 203 S.E. Alder Street
 St. Louis, Mo.—J. E. Mahan & Co., Inc., 1375 So. Kingshighway
 St. Paul, Minn.—George C. Bandy, Inc., 739 Pillsbury Avenue
 San Antonio, Tex.—Thompson-Hayward Chemical Co., 222 Seguin Street
 San Francisco, Cal.—Harwick Standard Chemical Co. of Cal., c/o Bay Cities Warehouse, 4001 Mullis Street, Emeryville, Cal.
 Seattle, Wash.—Great Western Chemical Co., 6900 Fox Avenue
 Trenton, N. J.—R. E. Camell, Inc., P. O. Box 139
 Tulsa, Okla.—Thompson-Hayward Chemical Co., 36 N. Galtier
 Wichita, Kan.—Thompson-Hayward Chemical Co., 727 Ohio

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NEWS

Soviet Chemical Industry Reported Handicapped

Soviet progress in developing an organic chemicals industry is severely handicapped by lack of originality on the part of Russian chemists and by their reluctance to learn and supply modern chemical structures and reaction theory. This appraisal of the Soviet "state-of-the-art" in organic chemistry research is contained in a summary and analysis of available Russian

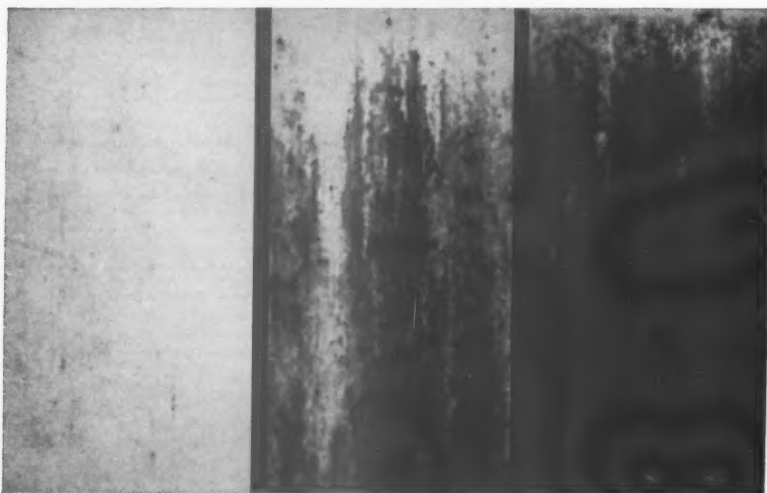
information prepared by an agency of the Federal Government and released for public distribution through the Office of Technical Services, Business and Defense Services Administration, U. S. Department of Commerce.

"The Soviets have not gone as far as the more scientifically advanced nations of the West in providing a sound organic chemical industry," the report states. "Soviet chemists in the acetylene field are synthesizing a multitude of compounds without appreciably increasing the degree of sophistication of their knowledge of acetylene chemistry. Because of the backwardness of the USSR in fully exploiting the conversion of their

vast stores of oil and natural gas through the acetylene route, Soviet progress in plastics, drugs, synthetic rubber, adhesives, and chemical intermediates will be retarded."

Acetylene is universally recognized as an important building tool in a nation's economy, and it was extensively used by the Germans during World War II in the manufacture of both military and civilian products. An energy-rich hydrocarbon, it is readily susceptible to many chemical reactions that result in valuable products such as synthetic rubber, plastics, drugs, adhesives, insecticides, rocket propellants, and chemical intermediates used in other segments of a chemical industry.

In any area...in exterior house paints



Magnification: 1X

ZINC OXIDE MAKES THE DIFFERENCE

These three panels have weathered six months on southern exposure in Florida. The panel at left is coated with a standard house paint containing adequate zinc oxide... the others with a commercial zinc-free exterior paint. The one at center is formulated with a commercial mildewcide.

Mildew resistance is desirable in any housepaint. These panels demonstrate that paints containing adequate zinc oxide are more resistant to mildew than those which depend on

chemical additives. But proper zinc oxide contents do much more than just impart mildew resistance.

Adequate ZnO provides durability and film integrity... resists staining by soluble dyes... withstands destructive effects of ultraviolet light... imparts better control of chalking characteristics. In short, ZnO lengthens the life, improves the service and appearance of any good paint. For further details, write American Zinc Institute.

At the present rate of development, the report estimates, Soviet research capability in the field will probably show only a slight increase by 1963, and the Russians will continue to depend on technology developed by the United States and Western Europe to assist them in the more advanced areas of acetylene chemistry.

The report, 60-21920 *Soviet Research in Acetylene Chemistry*, may be ordered from OTS, U. S. Department of Commerce, Washington 25, D. C. It contains 5 pages, price 50 cents.

Columbia-Southern Becomes PPG Division

Columbia-Southern Chemical Corp., a wholly-owned subsidiary, has become a division of Pittsburgh Plate Glass Co.

The new division will operate under the name of Pittsburgh Plate Glass Co., Chemical Division. The principal officers of Columbia-Southern Chemical Corp. have been elected as officers of Pittsburgh Plate Glass Co., effective January 1. On that date, Joseph A. Neubauer became Vice President and General Manager, Chemical Division, and Chris F. Bingham was named Vice President-Chemical Sales.

The change in corporate structure was made to consolidate the operations of Columbia-Southern Chemical Corporation with those of Pittsburgh Plate Glass Co. The general direction and management of the chemical operations will not be affected by this corporate change.



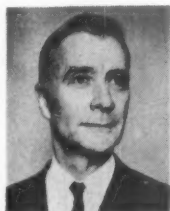
AMERICAN ZINC INSTITUTE, INC.

292 Madison Avenue, New York 17, N. Y.

PERSONNEL CHANGES

ADVANCE SOLVENTS

S. H. Longman has been appointed General Manager. Mr. Longman joined the firm in 1934 as a member of the laboratory staff, subsequently becoming Technical Service Manager. In 1942 he was appointed to the position of Plant Manager, and in 1957 was made Assistant General Manager.



**S. H.
Longman**



**I. G.
Davis**

MARY CARTER

I. G. Davis, Jr. has been elected President.

Mr. Davis, formerly Executive Vice-President of the company, which markets paint and allied products on a national basis, came to the firm from Rheem Manufacturing Co.

UNION CARBIDE

Robert L. Burke, Dr. Thomas J. Mahoney and Charles E. O'Rourke have been promoted to Product Managers in New Chemicals Marketing.

Mr. Burke is now Product Manager, Automotive Chemicals and will be responsible for expanding the company's marketing development efforts in the automotive field with emphasis on oil additives, gasoline additives, and lubricants.

Dr. Mahoney has been promoted to Product Manager, Rigid Foam. He will be responsible for the market development of polyethers and other products that go into the production of rigid urethane foams.

C. E. O'Rourke has been promoted to Product Manager, Food and Fine Chemicals.

GENERAL ANILINE

Dr. Clarence H. Buurman has been named to the position of Production Manager—Linden Dyestuff Plant.

In his new capacity, Dr. Buurman will be responsible for all operations carried out in the Vat Color Dept. at the plant.

EMERY INDUSTRIES

J. W. Ritz has been named Sales Manager of the Organic Chemicals Div. and **R. C. Bruch** has become Works Manager.

As Divisional Sales Manager, Mr. Ritz now will supervise, through direct sales representatives, sales of all products produced by the division. These include plasticizers, dimer and trimer acids, azelaic and pelargonic acids, synthetic lubricant bases, and textile chemicals.

Mr. Bruch will be responsible for production of all products of the division. He also will serve as administrative head of all plant operations in Cincinnati, including industrial relations, plant utilities and maintenance.

ALCOA

Rolf Rolles has been named to head the aluminum paint and pigment research program.

Mr. Rolles, who joined the company in 1956 as a paint chemist, has invented several processes dealing with aluminum pigments and the coloring of oxide surfaces. He is the author of a number of technical articles on aluminum paint manufacture and the use of aluminum pigments as a protection against rust and corrosion.

CARBOLA CHEMICAL

Milton C. Koenig has been appointed Industrial Sales Representative.

HEYDEN NEWPORT

Dr. Helmuth W. Schultze has been appointed Manager, Catalysts, for Nuodex Products Division.

GENERAL ELECTRIC

K. J. Morray has been named Sales Manager of the Silicone Products Department. He succeeds **Thomas J. March** who has taken a new post as Manager of Sales Operations of the newly-established Internal Automation operation in Schenectady.

In his new post, Mr. Morray will be responsible for fourteen sales offices throughout the U. S.

SUN CHEMICAL

Robert J. Filippine has been named to the position of General Sales Manager of the Building Materials Division East.

INTERCHEMICAL

Albert Saunders has been named Manager of the Bound Brook, N. J. plant.

CARBIC-HOECHST

Charles E. Cooper has joined the Sales Staff. He will call on dealer and co-producer accounts in the metropolitan New York and New England areas.

NATIONAL ANILINE

Paul J. Michaels has been appointed Plant Manager of the Haledon, N. J., plant of Harmon Colors.

ENTERPRISE PAINT

William Petrich, has been appointed as a member of the Industrial Finishes Division.

Mr. Petrich will concentrate his efforts in promoting paper product coatings, paper adhesives and correlated specialty coatings.

He will service accounts throughout the country under the supervision of Franklin deBeers, Jr., the firm's Special Finishes Sales Manager.

Correction

Neal M. Draper was recently promoted to Vice President of Allied Chemical Corp.'s National Aniline Div. This was incorrectly stated in the January issue.

Why ALMOST EVERY EMULSION MANUFACTURER RECOMMENDS MICA For EXTERIOR PAINTS



Mica gives a tougher film...gives increased resistance to grain cracking on bare wood. The platy, laminar, structure of the Mica reinforces the film, and improves sealing efficiency...giving excellent holdout. It improves resistance to flaking over heavily chalked surfaces.

Small amounts, such as 1/3 lb. to 1/2 lb. to the gallon can replace approximately 3 times that amount of other extenders.

The chalking rate is slow, and dirt or sooty mold retention is very low.

Mica improves brushing characteristics and film continuity.

The English Mica Co.

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LATEX HOUSE PAINT

Estimates are that the total volume of exterior latex house paints will reach two million gallons this year, gradually building up to 30 million gallons within the next ten years. Recently, PVP Magazine published a series of articles on recent developments in this ever-expanding field. This comprehensive series has been reprinted in booklet form. The 40-page reprint includes 9 articles by experts in the field on the various phases of formulation, manufacture and testing of latex paints for exterior application on wood. Priced at \$2.50 each, the reprints may be ordered by using the coupon at the right. Bulk prices are available if you wish.

Check the number of reprints desired and send with check or money order to:

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New York 1, N. Y.

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Finishes that "never need polishing," regardless of the weather, are a big feature offered by 1961 auto manufacturers. The product that made it possible: melamine resin. Cymel melamine resin also gives major appliances an important sales advantage — lasting non-yellowing finishes. In addition to superior gloss and color retention, Cymel offers the advantage of easy application and short cure time. Call your Cyanamid representative or write for technical information on Cymel Coating Resins. There's one particularly suited to give your product a better finish...and cut costs!

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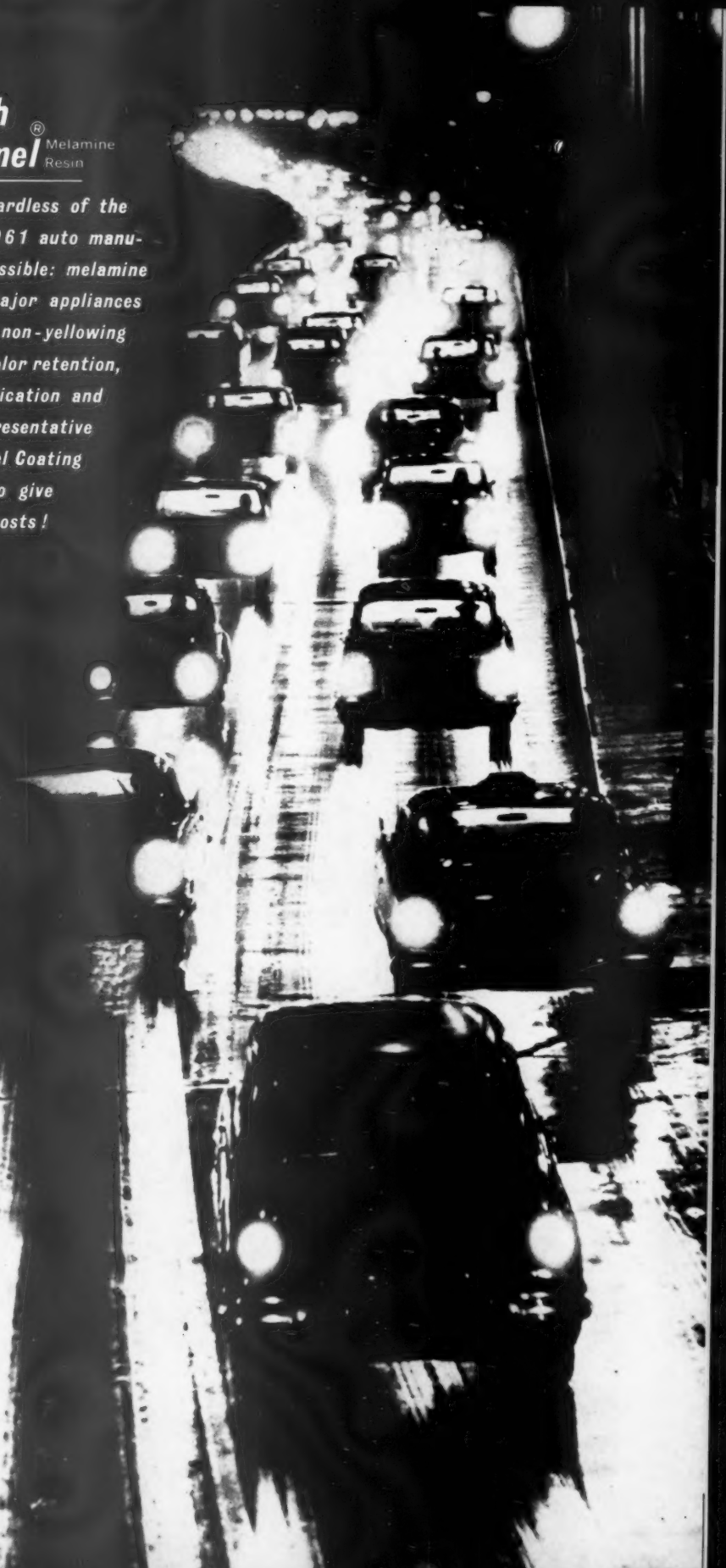
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Georgia Kaolin's
Hydrite MP**

With the introduction of Hydrite MP, the paint formulator has been given a new approach to the problem of controlling gloss and sheen.

The Hydrite MP is a low-cost, hydrated aluminum silicate with a unique controlled particle size that gives extremely high flatting efficiency. Hydrite MP has several advantages over other widely used flatting agents because of its lower oil demand, easier grinding characteristics and lower cost in the overall formulation.

Hydrite MP also gives improved uniformity of color and sheen over surfaces of varying porosity. Because of its lower oil absorption characteristics, Hydrite MP yields lower viscosity at equal PVC's and greater film integrity.

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